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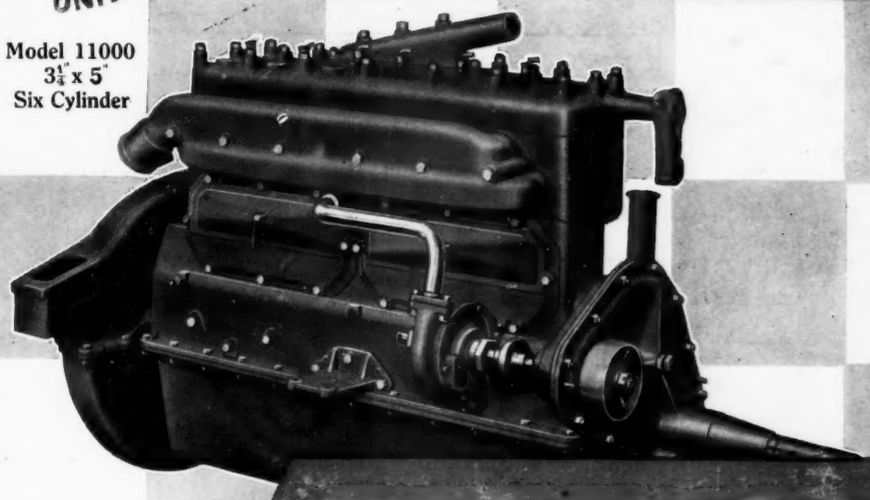

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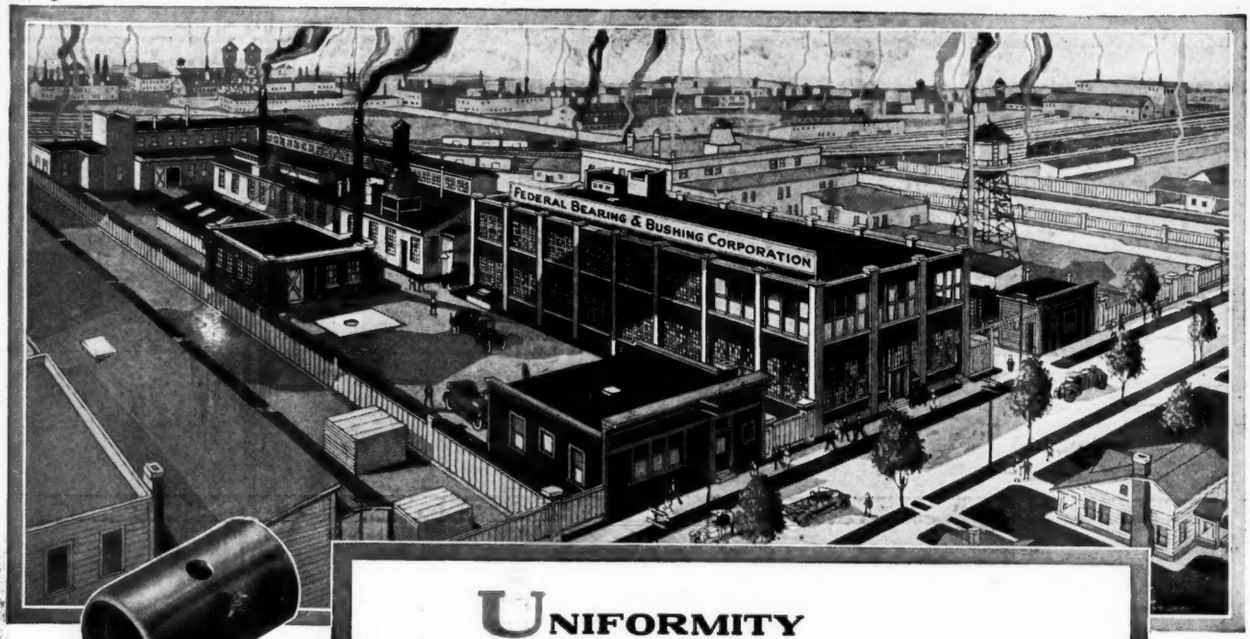

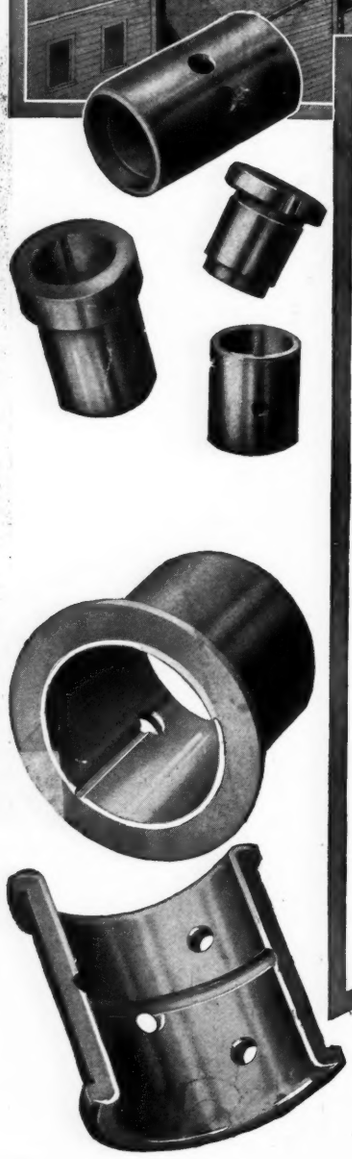

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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XLIII NEW YORK—THURSDAY, NOVEMBER 25, 1920 No. 22

German Automotive Factories Prepare for Competition

In this second article on Germany, Mr. Bradley visualizes for the American Industry the competition it will have from that country in the world markets. He tells of the factory equipment, of the possible production, and to as great an extent as could be expected, the plans of the engineers.

By W. F. Bradley

THERE are two Daimler automobile factories in Germany. The one at Marienfeld, near Berlin, produces trucks only, while the better-known concern is the Daimler Motoren Gesellschaft, producing Mercedes passenger cars and a light truck at Unterturkheim, near Stuttgart. Daimler-Marienfeld was running 1500 hands at the end of September, on an 8-hour basis, but was only working three days a week: Wednesday, Thursday and Friday. It was stated that it was intended to lay off 500 men and increase to 5½ days a week. It was uneconomical, particularly in the forges and heat treating departments, to work only 24 hours a week, but the German law did not permit laying off men until the working hours had fallen below 28 per week.

At least half of the Daimler-Marienfeld works have been built during the war. The factory buildings are excellent and the works well laid out, but the equipment is not designed for the most economical production. During the war the company built exceedingly fine rest and recreation quarters within the factory grounds, the building comprising large dining halls, kitchens, ice making plant, and bedrooms and quarters for the technical staff. The management seemed to regret having devoted the money to this purpose, for the effort was not appreciated by the men, and it was declared that the capital could have been used to better advantage at the present time.

The automatic telephone system established throughout the factory building is particularly good, being much superior to anything usually found in Europe. Electric current for power is secured from an outside company, but heavy oil engines are kept in reserve for emergenices, and storage batteries provide reserve current for lighting at night, etc.

During the war Daimler-Marienfeld was kept principally on truck production for the German army, the output being 60 to 100 per month, with a staff of 2500 men. In addition Diesel engines were built for submarines and some tanks were produced under designs furnished by the war department. The factory engineers considered that this was one of the reasons for the failure of the German tanks, for the army designs were decidedly faulty.

The factory is interested only in trucks, of which two types are produced: a 3-tonner with bevel gear drive and a 5-tonner with internal gear drive. The home business was practically dead owing to the high cost of production, for the smaller truck could not be offered at less than 100,000 marks without tires. In consequence, Daimler was working on export, particularly with Scandinavia and South America.

Daimler Truck Design

These two types of trucks were produced during the war for the German Army and in being continued for peace purpose the only change of importance is the fitting of solid rubber tires in place of steel or coil spring tires. The bevel gear type truck had to be abandoned during the war, and replaced by chain drive, for it was found that without rubber tires the bevel gear axle would not stand up. The internal gear drive truck proved quite satisfactory on steel tires, but owing to the absence of tires it was necessary to cut down speed. Trucks which normally ran at 10 miles an hour were rigorously held to a maximum speed of 7½ m.p.h. It was only on this condition that a service could be maintained. Vibration was excessive on the steel tired trucks and necessitated the use of castellated nuts and cotter pins on every bolt throughout the vehicle. During the war the use of copper and brass for truck construction became impossible, and even on the peace models steel piping is used extensively in place of copper, for gasoline, oil and water lines.

The Daimler construction is characterized by thoroughness and attention to detail, but the design is somewhat complicated. The engines have overhead valves operated by a camshaft in the base chamber and push-rods. The timing gear is in the center. During the war it was necessary to run trucks on the most diversified fuels; gasoline, kerosene, methylated spirits, benzol and lignite tar oil. Each truck had a small quantity of gasoline allowed for starting, this being carried in a reserve tank on the dash, and although some of the lowest grade fuels have been abandoned, the tank is still retained. Cast steel wheels are used exclusively.

Some attention is being paid to the agricultural tractor. A big, heavy machine built before the war has been replaced by a lighter model, but even this appears to be much too heavy and costly to operate under conditions prevailing in Germany.

Labor Trouble at Mercedes Plant

At the end of September the Mercedes automobile factory at Unterturkheim, near Stuttgart, was in possession of the military and had been closed for one month. The dispute arose over the refusal of the men to pay the 10 per cent State tax on their wages. This dispute had affected the whole of the factories in the district, but in other shops the men had returned to work after having decided to obey the law. The impression was obtained that the Mercedes dispute was being continued in order to enable the management to get rid of some of the more radical reformists, who, by reason of the law, could not be dismissed in the ordinary way.

Mercedes is the biggest of the German factories, its present staff being 8000, compared with 4000 before the war and 18,000 during hostilities. The present program provides for the production of two types of passenger cars, a 16 hp. four cylinder with 3.9 by 5.1 in. Knight engine and a 22 hp. four cylinder valve in head 4 by 5.5 in. engine. The chassis with Knight engine is sold at 145,000 marks without tires, and the price of the six-cylinder chassis, without tires, is 195,000 marks, but no guarantee is given that these prices will be maintained. Mercedes is also producing a fast 2-ton truck with L-head engine, designed to be used either with solid or pneumatic tires. These three models are all pre-war design.

It was impossible to visit the Mercedes factory, even the management being confined to small offices in Stuttgart and unable to get into their own works. Mercedes filled an important role during the war, for the whole of the big factory at Unterturkheim was employed in turning out aviation engines. These engines had been thoroughly developed both in the air and on the road during the three or four years preceding the war, and not only were they used throughout the hostilities with only detail changes in design, but they served as a model for many of the Allied engines. It was stated that the body shops were producing household furniture.

Benz Plant Busy

The impression of greatest activity in the German automobile industry was obtained at the Benz factory at Mannheim. There are three distinct establishments: a passenger car factory, a truck and tractor factory and works for Diesel and marine engines. The three establishments employ 8500 workmen and an office staff of 1800. During the war the greatest number of men employed was 16,000. Benz then devoted his attention to airplane engines, building his own type of six-cylinder vertical, and was also one of the biggest producers of submarine engines in Germany. Because of the special knowledge the factory possessed of airplane and submarine requirements, it produced very few passenger cars and trucks, but allowed smaller firms to build these to their design.

Benz was found to be in active production on passenger cars, which were being turned out complete with bodies built in the company's own works. Five distinct types are listed, but of these only the first two, given in the following list, appear to be in production to any important degree, while the six-cylinder was not seen at all:

Passenger cars—

4 cyl.	8-20 hp.	74.5 x 120 mm.	(2.93 x 4.73 in.)
4 cyl.	14-30 hp.	90 x 140 mm.	(3.54 x 5.51 in.)
4 cyl.	18-45 hp.	100 x 150 mm.	(3.94 x 5.90 in.)
4 cyl.	25-35 hp.	120 x 144 mm.	(4.73 x 5.68 in.)
6 cyl.	27-70 hp.	100 x 150 mm.	(3.94 x 5.90 in.)

In the horsepower rating given above the first figure represents the power from the taxation standpoint and the second figure the actual power developed.

In the truck factory three types are being built, of 3, 4 and 5-ton capacity. It is intended to get out very shortly a light type of agricultural tractor, generally on Ford lines, weighing about 4500 lb. A heavier agricultural tractor, weighing 4 tons, will also be produced.

The attitude of Benz with regard to aviation appears to be similar to that of other German firms having figured prominently in engine construction during the war. It is recognized that there is no immediate future, but development of commercial aviation is certain to come and on that account the factory should keep in touch by means of experimental work. The excessively high powered engines developed toward the end of the war are not considered suitable for commercial services and greatest attention will be paid to economical commercial types of about 200 hp.

Labor Conditions

In common with the whole of the German industry, the Benz shops are working eight hours a day; unlike some of the others, the factory is working a full six days a week. Work begins at 7 in the morning and finishes at

3 in the afternoon, there being a break of half an hour in the middle of the day for a light meal, which is eaten in the shops.

It is admitted that the efficiency of the workers is not very high. To avoid unemployment, there are restrictions covering the laying off of hands, and this has a tendency toward reduced effort. While men are earning seven to eight marks an hour, the high cost of all necessaries makes them no better off than when they were only earning 70 pfennings before the war. The food situation in Germany is still very unsatisfactory, and in the manufacturing districts there is undoubtedly a considerable amount of mal-nutrition.

The excessively high prices of automobiles in Germany is attributed by Benz to the high cost of raw and partly finished material, caused in a large measure by the unfavorable rate of exchange. Some of the small parts entering in the construction of cars have increased in cost 3000 per cent. There is still a shortage of leather, copper, brass, tungsten and sheet steel.

The coal situation is uncertain. Benz reported that their works had never been closed an hour for lack of coal, while other factories had been working only two or three days a week because of the lack of fuel.

Benz gets 15,000 horsepower from water power in the Black Forest, but in addition they have crude oil engines capable of running the factory in case of a failure of the main supply. Contracts have been placed abroad for big supplies of crude oil. Replies received from manufacturers regarding the coal supply were varied. While some admitted that they would not be affected, others stated that they would have to close during the coming winter, and others again believed they could only keep going with difficulty. The stocks laid in comprised hard coal, crude oil and lignite.

IN this article Mr. Bradley makes it plain that German automotive engineering has advanced only slightly since the armistice. His interpretation of the plans of the industry in that country makes especially valuable a study of the recent articles in Automotive Industries describing the German war trucks and the recent description of the Mercedes-Knight car. These descriptions tell of the competition you will meet in export trade.

In Mannheim it was noted that very serious restrictions in street lighting had been put into effect with a view to economizing coal.

The Benz passenger car factory consists of one-story buildings, with the exception of the engineering and executive offices. They have been considerably extended during the war, and plenty of space is available for further additions. The models produced have undergone very few changes since the war, for general conditions have made it impossible to produce new designs. Benz, however, is working on new types, for both the home and foreign markets, and undoubtedly will be one of the most active of the German firms in the international field. No information is available regarding the new types. The Benz policy is to produce everything in its own shops with the exception of ball bearings, magnetos and tires. A high grade article is the objective and there is no intention of going into the cheap car field.

Opel a Private Concern

The Opel factory practically monopolizes the village of Russelsheim-on-the-Main. Employing 3000 men, compared with 7000 during the war and 5000 before 1914, the present factory is an entirely new structure composed of 5-story buildings, while the original factory is being used for repair work. The Opel firm is owned by members of the Opel family, and the amount of capital and earnings of the concern are not made public.

At present Opel is producing two passenger cars, an 8-25 hp. and a 14-38 hp., a 4-ton truck, bicycles and a motorcycle. Although claiming to be in regular production on 200 complete cars per month, and the same number of trucks, the impression was gained that the works, which are very complete and allow of practically everything being built under one roof, were running far below their maximum production. Various jobs were noted which were not concerned with automobiles, and while some of the equipment was entirely up to date, other departments were old fashioned and some of the machinery was being run most economically, as if merely to give employment to the hands. The body works are extensive, but hand methods only are employed, and wood construction is used practically throughout. The bicycle department is small, and the motorcycle section, which has just got into production, is working on what must be described as a motor-assisted bicycle. The power plant is a small single cylinder engine attached to the frame and driving the wheel by means of a chain.

During the war Opel was engaged on trucks and staff cars and later on on aviation engines built to the design of a Munich firm. In order to test cars when roads were closed to ordinary traffic, the Opel company built a mile concrete track a short distance from the works. This is almost circular and is banked for speeds of about 65 miles an hour. At present it is used for testing all cars produced in the Opel factory.

The big 5-story stone and concrete factory of the N. A. G. (National Automobile Company), in one of the suburbs of Berlin, is particularly Teutonic. Viewed from the outside it has the appearance of a fortress, and this impression is enhanced by the entire absence of noise, smoke or steam. The whole of the present structure was erected during the war, and as far as buildings alone are concerned compares very favorably with the best to be found in America or elsewhere. Use is made here—although this is not an exclusive N. A. G. feature—of continuous chain elevators, carrying two persons, and, of course, requiring no attendant.

Engine and Chassis Tests

N. A. G. is one of a combine including the Hansa-Lloyd and the Brennabor companies. Under this arrangement it is specializing on a 3-ton truck and on a passenger car with a four cylinder 3.27 x 4.65 in. engine. Some work is also being done on electric trucks for city service. The factory is running a staff of 1400 men and building largely for export in view of the depressed condition of the German market. Very few changes have been made in design since 1914, either for the trucks or for the passenger cars. Modifications, however, are going through, and among these are cantilever springs and spiral bevel gears. For these latter comparative tests are being made with Gleason gears and a German type of spiral bevel.

All the car bodies are built in the company's own shops and are all wood construction. The disappearing top is used on all of them, and the claim is made that patents are held for this feature. The factory has a very good chemical laboratory and experimental department, and is well fitted for engine testing. All engines are run in on coal gas and tested for power on gasoline; the

chassis are run on rollers and finally tested on the road.

Although not laid out for quantity production, as it is understood in America, the N. A. G. shop equipment is good. All machines are driven by electric motors, and instead of these being placed on the floor, they are mounted on a uniform type of standard with reduction by means of silent chain to the pulley shaft.

Bosch Working Under High Pressure

Bosch, the world-famed magneto concern, at Stuttgart, was found to be working at high pressure with a staff of 8000 men, compared with 6000 before the war and 10,000 during hostilities. In view of the depressed condition and the generally small production of the German automobile industry, it was rather difficult to understand where the output was being disposed of. Switzerland, of course, is open, but it is a small field; the import duty makes it rather difficult to do business in England; in France there is a distinct stand, on patriotic and sentimental grounds, against magnetos of German manufacture; in America the possibilities are not very great, and Italy is not yet buying great quantities of magnetos outside her own territory. This exhausts the automobile producing countries, and yet Bosch appeared to be in extensive production and was employing more hands than before the war.

One explanation of this is that since 1914 starting and lighting sets have been added, and as the amount of work in one of these is very much greater than in a magneto, the number of hands could have increased while the number of magnetos produced could be less than before the war.

While there are other magneto manufacturers in Germany, notably Mea and Eisemann, the Bosch company may be estimated to have 75 per cent of the domestic business. Every passenger car built seems to be fitted with the Bosch lighting and starting set. Two distinct factories are being operated: the original establishment, which is working exclusively on magnetos of various types, and a new factory producing the lighting and starting set and spark plugs. This second establishment was originally a piano factory and was taken over and converted during the war. The Bosch factory, of course, is elaborately specialized and comprises much machinery designed specially for the firm's own particular class of work. Women and girls are employed to a certain extent, in distinction to the automobile factories, from which all female labor has been removed. The special repetition work also makes it possible to apply the piece work system to an important extent. There is no indication of the adoption of ignition by generator and battery, for all Germany appears to be wedded to the magneto.

Unlike the Allies who found the magneto shortage a really serious problem during the war, Germany was very well supplied, for the Bosch factory alone was more than sufficient to meet the requirements of the German army motor and aviation services. On this account part of the Bosch works were made use of for producing shell fuses, and portable electric lighting sets, wireless telegraphy sets and other special electrical equipment was made for the war department. The house lighting sets, which are on the same general lines as those now produced in America, will not be continued, as there is no available home market.

Bosch was affected recently by the strike of the workers against the 10 per cent tax on wages, but the men gave in, whereas the workers at the neighboring Mercedes factory remained out. An 8-hour day is in force, the men working straight through with the exception of a half hour break at midday for a light meal which is eaten in the shops.

Conclusions

The technical condition of the German automobile factories is good. The factory buildings are all excellent; they are modern, well laid out, healthy, and provide excellent conditions for the workers.

The value of the equipment varies not only with the factories, but with the different departments of the factories. Some of the most modern equipment is found side by side with old-fashioned machinery.

No German automobile factory is efficiently equipped for modern quantity production. There are no conveyor systems and there is a dearth of devices for economizing labor. It is obvious that even during the war, the German automobile factories did not learn the lessons of quantity production to the same degree as the Allied nations.

The general layout is good, but the mechanical equipment is open to improvement.

Germany is best fitted to enter into competition on a small quantity, high quality basis.

The industry is likely to get more and more into the hands of a small number of comparatively big firms, or group of firms of medium importance, these firms producing practically the whole of the automobile under their own roof.

The assembled car is practically unknown in Germany.

Safety of High Tension Magnetos in Explosive Atmospheres

TESTS have been made for the British Advisory Committee for Aeronautics with nine magnetos to ascertain whether they would fire an explosive mixture surrounding them under any operating conditions. The magnetos were operated up to very high speeds and quite a few of them broke down in the tests. The breakdown of the 4-cylinder machines was due partly to insulation failure and partly to excessive potential difference across the armature owing to the safety spark gap being too large to protect the windings. The Advisory Committee points out that it is very desirable that the dimensions of this gap should be standardized on all machines; the lengths of the gap in two machines are now very often in the ratio of two to one.

There appears to be a tendency to regard the waterproof casing as sufficient protection for the safety gap without the use of wire gauze around the points. With the present type of magneto this practice is certainly not a safe one. Sparking in small metallic pockets containing gas (such as the primary make and break box) may be permissible, but large spaces, such as the interior of a magneto casing, should not be permitted to contain exposed safety gaps when explosive gas is likely to be present, the committee concludes.

SOME rather interesting work has been undertaken for the Motor Transport Corps by the Bureau of Standards in connection with their experiments on the deterioration of automobile parts in service. A number of bearings and gears have been accurately weighed on the Bureau's balances and have been placed in cars in service. After a certain length of time these parts will be returned to the Bureau and re-weighed, the difference in weight representing, of course, the loss in metal due to wear.

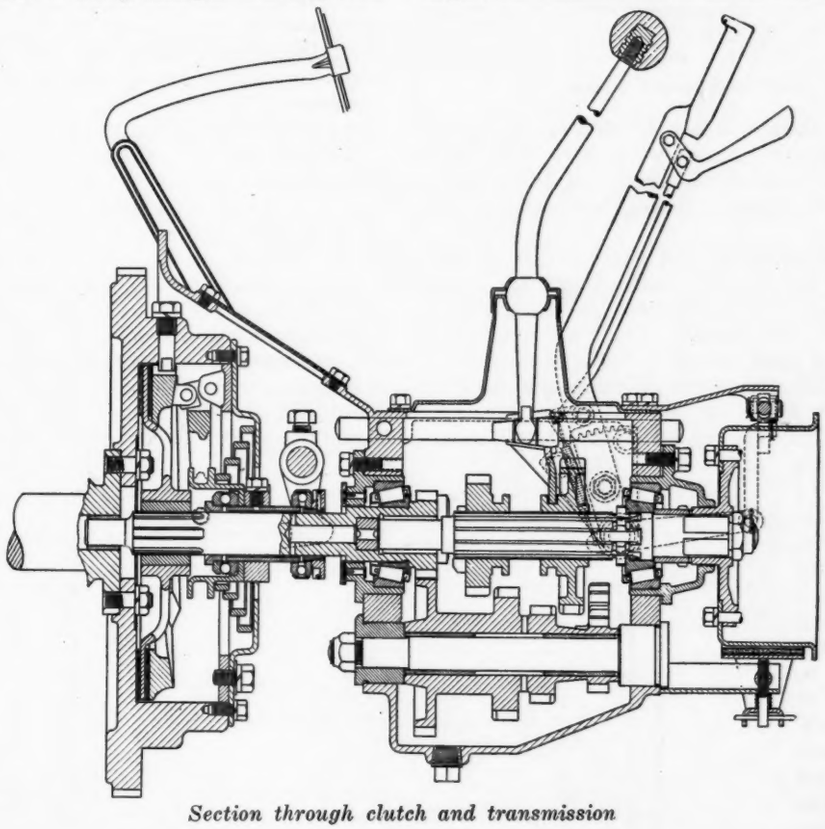
Nash Engine Is Adapted to Four-Cylinder Practice

New product closely follows the six-cylinder features with the latest combustion refinements. Lubrication of powerplant is through positively driven gear pump. Chassis of 112-in.-wheelbase is employed for the four models of cars on 1921 program. New constructional features described.

By Roy E. Berg*

THE new product of the Nash Motors Co. follows closely the features of the well-known Nash Six; a few differences are necessitated by the fact that the car is of a smaller pattern and powered with a four-cylinder engine of the overhead valve type. The chassis is standardized in that it has a wheelbase of 112 in. for all body types, which include a five-passenger touring, two-passenger roadster, five-passenger sedan and three-passenger coupe. In road trim the touring car weighs 2650 lb., which gives a comparative idea of the car size.

The four cylinders of the engine and the upper half of the crankcase are a single casting. Cylinder dimensions are 3¼ by 5 in., which gives a piston displacement of 165.9 cu. in. The overhead valves are assembled with the detachable piston head and are actuated through push rods and rocker arms. Three point suspension is employed, one point at the front and one on either side of the engine at the rear. A pressed steel oil sump completes the lower formation of the engine and another pressed steel cover is fitted over the valve mechanism.



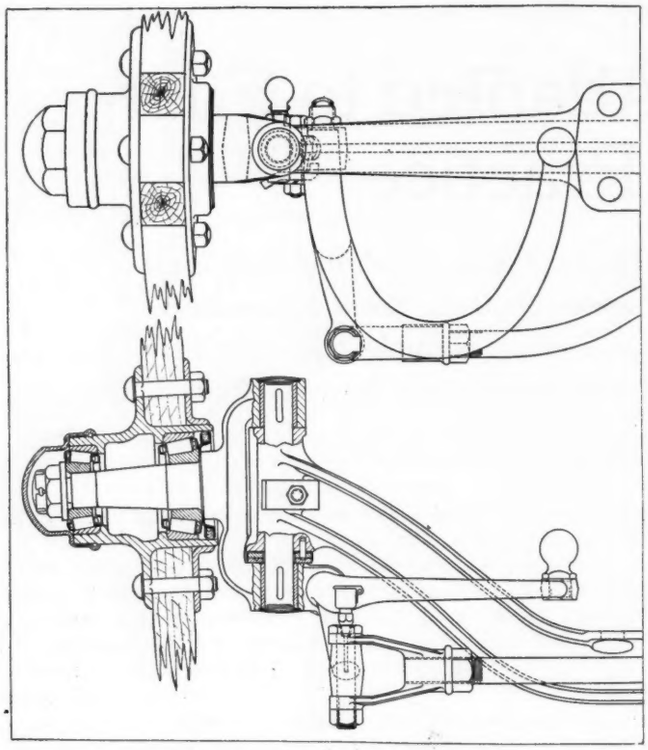
Section through clutch and transmission

The pistons are of grey iron; they measure 3½ in. in length and are fitted with three step cut piston rings of 3/16 in. width, all being placed above the piston pin. The skirt of the piston is grooved and drilled to relieve any possibility of oil pumping. The after boss of the piston pin is drilled and tapped to accommodate a taper locking pin. The piston pins are of tubing, hardened and ground, and measure 15/16 in. in diameter. The upper end of the rod is bronze bushed and has a bearing length of 1½ in. on the pin.

The connecting rod is of the "H" section type and measures 11.5 in. in length, which gives a rod length to crank-throw ratio of 2.3. Another reference to this ratio will be made further on. The lower end of the connecting rod might be termed conventional. The lower cap is held on with two bolts fitted with castle nuts. Laminated shims are interposed at the bearing cap junction. The white metal is cast directly into the big end, which construction assists materially in heat dissipation.

One of the most unusual features of construction found in this engine is the crankshaft, which is of the two bearing type. As a result of the use of this crank construction the overall length of the engine is only 17⅝ in. Cooling space between the cylinders has not been sacrificed because of this construction, for each cylinder is completely surrounded with water. The cooling jacket is also very long, extending almost down to the crankcase and up to within ¼ in. of the top of the block. The front crankshaft bearing measures 2¼ in. in diameter by 2¾ in. in length and the rear bearing 2¼ by 3 5/16 in. For an engine of this size these bearing diameters are very large. However, the rigidity and freedom from vibration of this shaft are not due solely to the large diameter, for a very unusual counterbalancing system is employed. Three counterweights are fitted, these being separate steel forgings, forged and shrunk in place over dove-tail anchor heads. This is a very reliable method of securing the counterweights, and the Nash engineers state that the re-

*Technical Editor *Motor Age*.



Axle and steering knuckle design

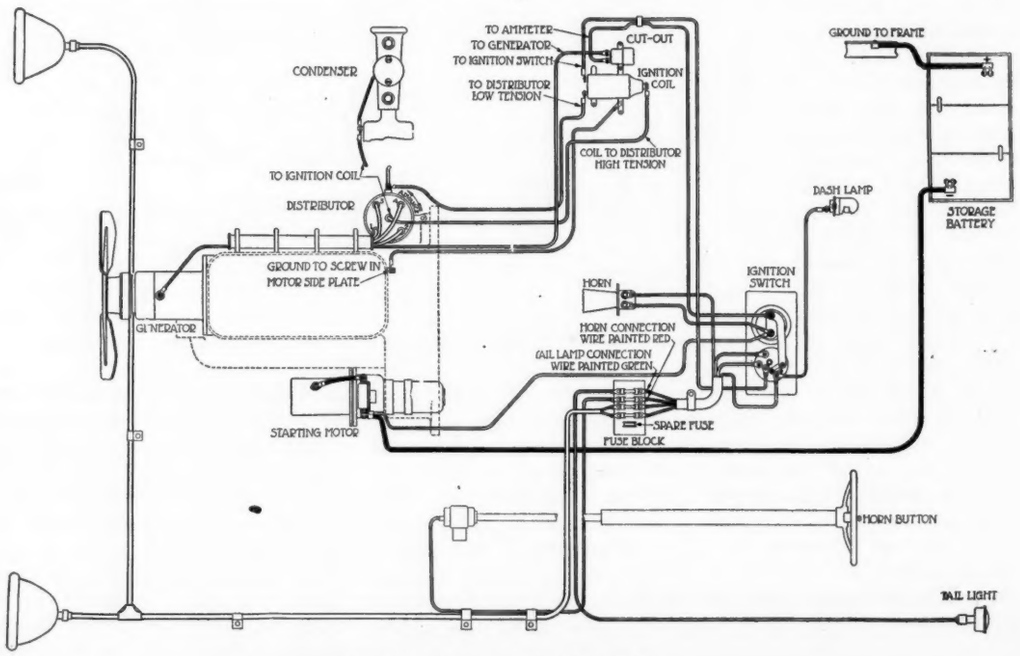
sults are practically equal to an integral forging. After the shaft is fitted with the counterweights it is balanced on Norton and Akimoff balancing machines for dynamic balance, a perfect static balance having been secured previously.

The camshaft is driven by helical gears and is of very large diameter. Like the crankshaft, the camshaft is also carried in two bearings, and these measure 1⅛ x 2⅝ in. (front) and 2⅛ x 2¾ in. (rear). The rear bearing of the camshaft serves a dual purpose, for at its center a helical gear is cut which drives the oil pump and ignition head through a shaft which is inclined at an angle of about 17 deg. The valve rods are actuated through mushroom followers and pass through removable guides. A tappet bracket is secured to the block by means of four accessibly located cap screws. By removing these four screws the eight tappets may be lifted out as a unit. The rocker arms have a rocking contact on the valve stems and a ball contact on the push rods. The fulcrum of the rocker arms is a hardened shaft extending over the length of the engine. On this the rocker arms are threaded. Light end bearing springs are placed against the arms to eliminate rattle. Because of the peculiar contour of the cams, as much as 0.010 in. tappet clearance may be used without creating undue valve noise. The valves are of conventional type, having a clear diameter of 1 13/32 in., a lift of 23/64 in. and ⅜ in. stems. The intake valve is of nickel steel and the exhaust of tungsten steel.

Some of the very latest refinements in combustion engineering are embodied in the manifolding and combustion chamber. A 1 in. Schebler plain tube carbureter is fitted. After leaving the carbureter the gases pass through the external intake manifold, which is secured against the exhaust manifold by through studs. At the ends of the "T" head section of the intake the gases enter round horizontal passages, one for cylinders Nos. 1 and 2 and the other for cylinders Nos. 3 and 4. These latter passages are integral with the exhaust manifold, and constitute a very effective hot spot arrangement. The walls of the cored passages through the exhaust manifold are very thin and require only a few engine revolutions to become heated. The surface distribution of the heavy fuel is therefore caused to pass over these hot walls where they become equally distributed to a Siamese pocket for the two intake valves. Mention may be made of the fact that no pockets exist in the intake passage for the accumulation of liquid puddles: The combustion chamber is wholly within the removable head. All surfaces are machined, which insures absolute uniformity of compression in all cylinders.

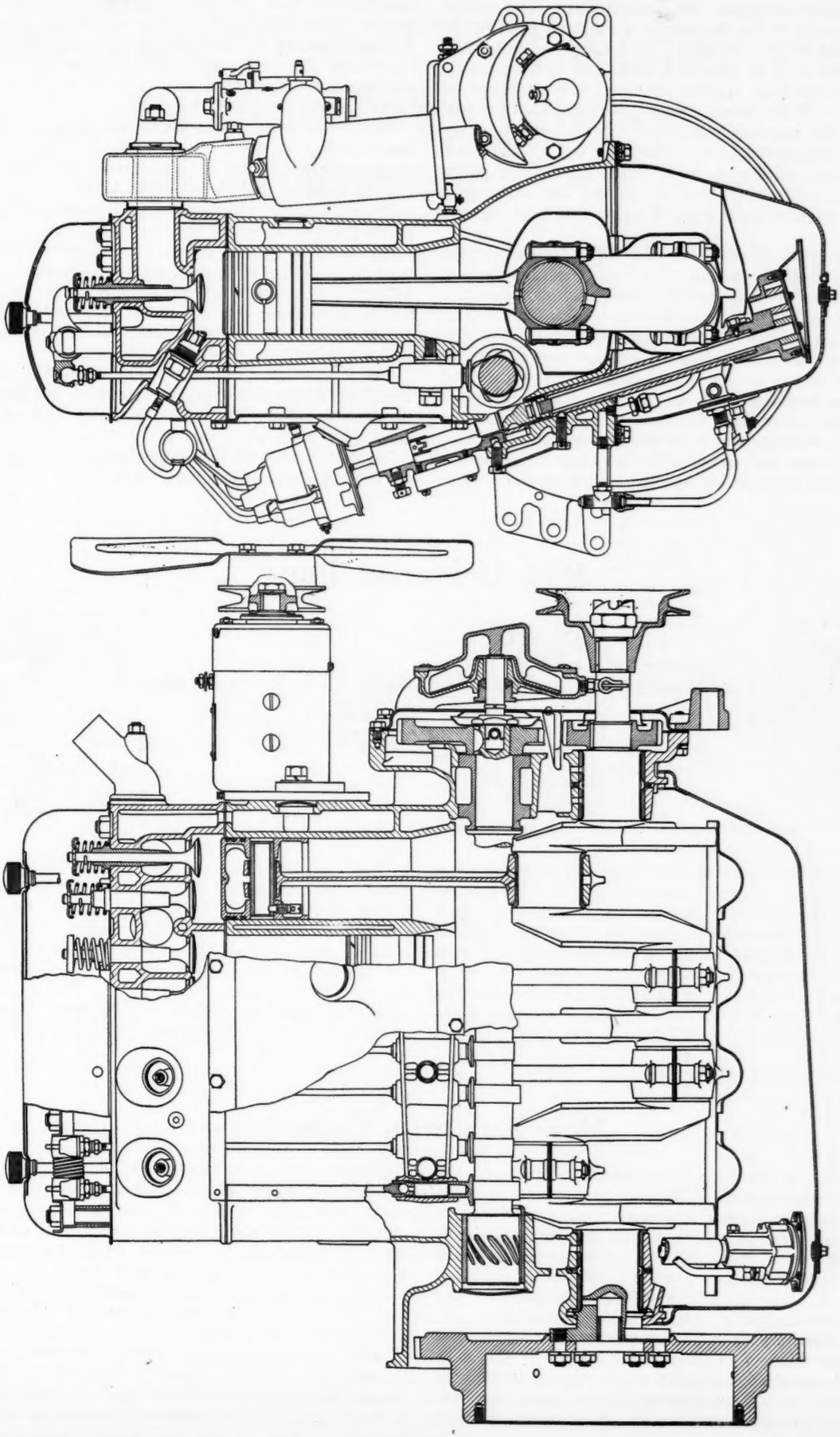
Lubrication of the engine is through a positively driven gear pump. Pressure leads feed the oil to the main bearings, and the connecting rod bearings are oiled by splash from the scoops which dip into the trough. Oil is also conducted to the timing gear compartment and thrown on the gears. A level indicator is provided on the steel pan and a pressure gage on the dash.

Cooling is by a centrifugal pump and tubular radiator. The pump is located on the forward end of the camshaft, in a readily accessible position. The water capacity of the radiator and engine is 15 quarts. The radiator inlet and outlet, in addition to the usual hose connections, also have flanged connections secured with two cap screws, which makes it unnecessary to disturb the hose connections when dismounting the radiator or removing the engine head. The cooling fan is mounted on the generator shaft, where it is driven by a Vee type rubber belt at 1½ times engine speed. This combination unit is very much similar to that employed on the Nash Six.



Wiring diagram of Nash Four

Nash Four-Cylinder 3¼ x 5 in. Passenger Car Engine



Note particularly the balanced two-bearing crankshaft, symmetrical connecting rods, two-bearing camshaft, overhead valves with cover, spark plugs in cylinder head, inclined drive of oil pump and ignition unit, combined generator and fan drive and pressed steel oil pan

A Borg & Beck clutch is used and clutch and transmission together complete the powerplant. The transmission is secured to the engine by a half bell housing on the rear end of the crankcase. The gearset affords three forward speeds and is identical with the corresponding unit of the Nash Six. Roller bearings are employed on the main shaft of the transmission. The lay shaft is stationary and the countershaft gears revolve on it, being fitted with a bronze bushing. The rear end of the main shaft of the transmission is fitted with speedometer drive, and immediately back of this is carried the emergency brake. The conventional type of universal joint is employed.

The rear axle is of the semi-floating type, having the center line of the pinion and ring gear centrally located with reference to the differential gears. The construction of the rear axle housing is rather unusual. The central member, which carries the drive and differential gears, has secured to it on each side a megaphone shaped pressed steel housing which at its outer ends is riveted to the wheel bearing housing. An adjustment is provided for the pinion gear as well as for the ring gear. The front axle is also Nash made and is of the reverse Elliot type.

The springs are flat, practically speaking. The torque is taken by the springs by the Hotchkiss method. The front springs are slightly different from conventional practice, in that the front ends are carried outside the frame. This allows of greater movement of the springs without causing a frame bump, and the extra insweep of the frame allows a very short turning radius. The rear springs are 53⅜ in. in length by 2 in. in width and the front springs are 37⅛ by 2 in.

The frame is not fitted with a splash apron, the running-board being secured to the bottom flange direct. The measurements of the frame channel are 6 in. deep with 1½ in. flanges, and the stock is ⅛ in.

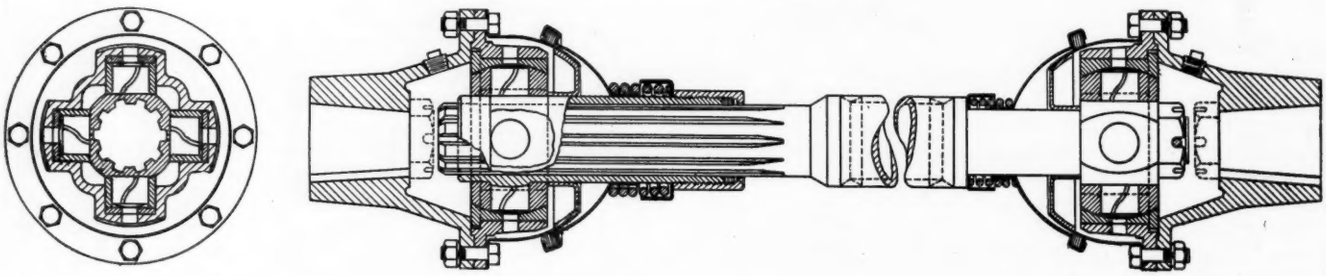
Steering is by the conventional worm and worm wheel mechanism with an 18 in. steering wheel.

The electric system consists of Wagner starting motor, generator and ignition unit, with a 90 ampere hour Willard battery. The starting engagement of the motor is by a newly developed manual shift provided with an overrunning clutch. The shift has a spring follow-up motion which positively disengages the gears.

The bodies of these cars bear a marked similarity to the Nash Six bodies, but are of course smaller. The open cars are fitted with 32 x 3½ in. cord tires and the closed cars with 33 x 4 in. cords.

These four cylinder cars are being built complete in the Milwaukee plant of the Nash Motors Co.

Pick Universal Joint



MOST metal universal joints now in use comprise a central cross or equivalent part and two forks connecting with the cross or ring at right angles to each other. Thus the power is transmitted from one fork to the cross or ring through two trunnion bearings, and then from the cross or ring to the other fork through the other two trunnion bearings. A universal joint in which the power is at all times divided between four trunnion bearings is manufactured by the Carl Pick Co. The bearings in this case are arranged to slide in longitudinal slots in the ring which forms one member of the universal. All major parts are steel forgings, and the bearing surfaces are hardened and ground. The universal is enclosed in a housing composed of three steel stampings which retain the lubricant. It is made in three sizes, of 4⅜, 5 and 6 in. outside diameter, respectively. These universals are furnished in sets together with tubular propeller shafts. S. A. E. standards are adhered to throughout.

New Aviator's Compass

THE Bureau of Standards has made a study of the Bamberg telecompass, a German instrument recently received from the Bureau's representative in Europe. This compass depends for its operation upon the characteristic of selenium, which causes a variation in its electrical resistance with any change in the intensity of illumination falling upon it. The installation is so arranged that the compass itself may be mounted in the tail of the airplane at a distance from all disturbing magnetic influences. The bowl of the compass contains two electric bulbs diametrically opposed which throw their rays through a lens which concentrates them upon two corresponding selenium cells mounted on a bridge extending across the top of the bowl. A metal disk, corresponding to the card of the ordinary compass, is cut in such shape that it acts as a blind for the illuminating elements. Thus the intensity of lighting of the selenium cells is varied in accordance with the position of the magnetic element carrying this disk. By means of a properly arranged electric circuit, the position of the magnetic element is made known to the pilot by the indications of an ammeter suitably calibrated and mounted on the instrument board. The navigator is able to direct the pilot on a desired course by means of an indicator connected mechanically to the compass in such a manner as to make possible the rotation of the bowl at will.

Extra Long Body Chief Requirement of Plumbing Trucks

The heavy truck is gradually replacing the light one among jobbers of plumbing supplies and plumbing contractors, though the latter type still predominates. Particular features are needed in a truck to meet the peculiar requirements of this industry, which presents a good market.

A NUMBER of special requirements for trucks destined to serve jobbers of plumbing supplies and plumbing contractors are described in an interesting report prepared recently by *Domestic Engineering*. The distinctive truck needs of the plumbing jobber differ considerably from those of the petroleum and concrete industries, but are nevertheless equally difficult to meet. In fact, a reading of this report, with its expressions of opinion from men prominent in the jobbing field, almost leads one to think that what the plumbing jobber wants is a 2-ton truck that will carry a 4-ton load and always be in good repair.

Though this is, of course, an exaggerated statement, it is true that the conditions to be met in the trucking problems of the plumbing jobber call for a truck with somewhat variable possibilities. Many of the articles carried by jobbers of plumbing supplies, for instance, have little bulk, but great weight. This fact tends to result in the overloading of the truck, especially in hauling to the depot. On the other hand, such articles as tanks and bathtubs have no great weight, but require a great deal of carrying space.

The chief difficulty, however, is the carting of pipe. Because of its length, pipe causes a swaying and twisting motion, which is a severe test on the short bodied truck. As a consequence, a very long bodied truck is needed to meet the needs of this particular market.

Practically all plumbing jobbers and plumbers are located in cities of some size, so that the road problem is a minor one in connection with their trucking. Some jobbers do considerable country trade, but taken as a whole, trucks used in this industry are operated over comparatively good roads.

Trucks of particular qualifications are necessary to overcome the difficulties outlined. A comprehensive survey of the field shows that the 2-ton and 3-ton truck are used most widely. Since the jobber has a number of small delivery trips to make, 1-ton and even smaller trucks are also used extensively. About one out of every ten trucks in use at present are 5, 6, or 7-ton trucks. These heavier trucks meet the service requirements in general better than do the lighter ones, but the upkeep cost, and the necessity of often running with less than capacity loads operate against their more general use. It may be said, however, that the tendency is rather toward larger than toward smaller trucks.

The superintendent of transportation of one of the largest jobbers of plumbing supplies in this country is quoted as follows: "This is the hardest business in the world on trucks. Our trucks must carry big loads, and make good time also, and very often much of the stuff is long and causes a great deal of swaying. Now, however, we are getting some trucks with extra long body and chassis—one of them has a nineteen foot body, which is just the thing for hauling pipe. Our trucks usually have more than their rated capacity load, and make long trips...."

Another man prominent in the industry said: "Our trucks get pretty hard usage, as they nearly always carry more than their rated capacity. Our smaller trucks make from eighty to one hundred miles a day, while the heavier ones travel on an average of from fifty to sixty miles a day."

As indicative of what plumbing jobbers expect of their trucks, the following statement by an Illinois man is interesting: "In city delivering we find large trucks to be the most profitable, and we expect a truck to last about five years. At the end of that time it is better to scrap them than attempt to keep them up." Another executive counts four years as the useful life of a truck in this business. Still another says, "A truck should last five years or more, and will when handled properly."

This latter jobber adds, "The jobber of plumbing supplies in Chicago cannot use his trucks to the best advantage because of the great number of little odd lots to be delivered to all parts of the city. This is due to the unusual diversity of plumbing in this city.....Chicago represents the whole history of plumbing, from the oldest and crudest to the newest and best." This statement is interesting, as Chicago is one of the largest potential motor truck markets in this country insofar as the plumbing jobber is concerned.

Throughout the opinions expressed by a number of prominent jobbers of plumbing supplies, the general sentiment against the very light truck is noticeable. So also is the insistence upon trucks which would stand up under heavy loads and be ready for service at all times, without being in the repair shop too often.

A general survey of the jobbers of plumbing supplies indicates that there are in use at the present time about 1047 trucks in this industry. These figures are conservative, however, and the actual number probably exceeds this by a good deal.

While the jobber of plumbing supplies is the largest potential truck buyer in his field, the plumbing and heating contractor also uses many trucks. The character of goods handled by the plumber, in fact, almost demands that he use a truck, for they are chiefly iron, steel and clay, and have both weight and bulk. At first the plumber depended almost entirely upon the light trucks, such as the Ford, but his business is rapidly growing so that heavier and more substantial trucks are required.

The truck best suited to the work of the average plumbing contractor should be fast, dependable and capable of carrying from ¾ to 2½ tons day in and day out without continually needing repairs. The 1 and 1½-ton trucks will probably be the most popular, while those with extra length bodies, for carrying pipe, etc., will get special attention.

Tendencies in British Engine Design Noted at Olympia

This year's show supplies a much clearer view of the British thought than did last year, when few departures from pre-war practice were in evidence. In the recent show, there were on display a number of post-war models, most notable of which were the carefully designed, small powered cars.

By M. W. Bourdon

A FAR better perspective of the true post-war tendencies of British design has been afforded by the London Show this year as compared with that of last year. Some, if not nearly all, of the entirely new models shown at Olympia in 1919 could then almost be considered purely experimental; they were certainly untested and not in any sense examples of production models. They displayed the aims and ideals of their designers rather than the final form in which they would be delivered.

This year, however, there are comparatively few cars which have not passed the experimental stage; the majority are in production, though if the truth be told there are several of which deliveries had not commenced to the public only a few weeks ago, despite their having been exhibited in their original forms last year.

Although there is not evident this year the upheaval in design which was so pronounced in a large number of cases last year, entirely new models with features departing from hitherto standard practice are to be seen. But as a rule they do not give the idea that they have set a lead which will necessarily be followed, and their individualities do not imply new ideals. As an example, the new eight-cylinder-in-line Leyland may be quoted. It has "something different" at almost every point from front springs to final drive, but most of the peculiarities are not likely to act as a spur to other makers to attain the same ends in a similar manner; they will have no such marked effect, for example, as the original introduction of the Knight engine, which unquestionably set up a new standard in quietness of running and had marked effect in that direction on automobile engines generally.

New Developments Demanded by Economy

But while there are no epoch-making developments in the fundamentals, evolution has obviously been in progress during the past twelve months, and in some cases it has left a clear imprint indicating the direction of a general tendency.

The engine of the new 50-hp. Sheffield Simplex Six may, however, set a lead that will be followed by other makers of high efficiency cars of the highest grade. It is the first private car to have the Ricardo trunk pistons, which represent a system of construction having many practical and potential advantages. Ricardo is becoming recognized as one of the ablest designers of automobile engines in Great Britain, and the list of makers using him as technical adviser is constantly being added to. His trunk piston system—originated for British tanks—appeals forcibly to those engineers who are not satisfied with the existing standards of internal combustion engine efficiency, and is now used in a British farm tractor (the Peterboro, which did so well at the Lincoln trials) and a truck, in addition to the Sheffield Simplex car.

Not the least noteworthy feature of the show is the rapid development of a type of car which is being fostered by the shortness of money among buyers and the increased costs of fuel, taxation, tires and every other item connected with the running of an automobile. This is known as the "light car," and, although under this generic title a miniature two-seater has been inferred until quite recently, it now covers chassis weighing from 1200 lb. complete with a two-seated body to 2200 lb. with a four-passenger.

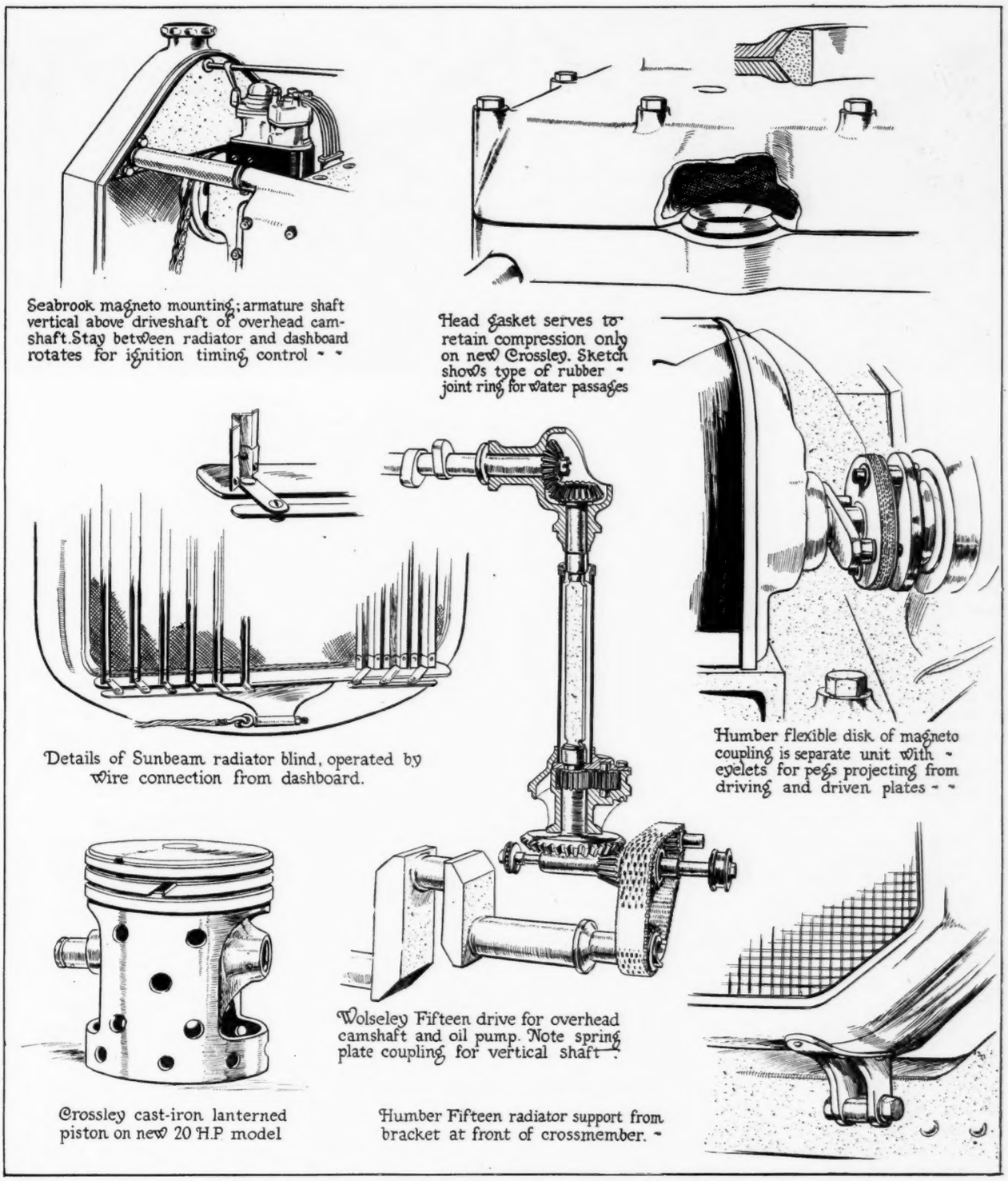
The Light Four-Seater

It is in connection with the four-passenger type that development is most pronounced. It is not a cheap car to buy; it often runs up to $3,000 and sometimes more; the attraction which it has for prospective users lies in economy of upkeep. This type, which has an engine of from 85 to 95 cu. in., has every prospect of experiencing a small "boom" next year, and a large number of its buyers are men who are not restricted in respect of capital outlay—within reasonable limits—but whose surplus of income available for running a car has become reduced. This type of car in the future may have its effect upon American ideas and design.

There is a big jump from the type of car just mentioned to that at the other end of the scale, on which the best brains of the European industry appeared to be concentrating a year ago. There has been no falling off in the number of firms devoting their whole attention to this class of vehicle; in fact, they havs been supplemented by the Leyland, the new Sheffield Simplex, Rolls-Royce, Napier, Lanchester and Ensign, while Guy, Straker-Squire, and Daimler are still specializing on cars in a slightly lower price class. There has been no reduction in price, but a tendency rather in the other direction, and though outputs are small, the limited market is still open.

Power Unit Construction

To come down to details concerning design tendencies, first consideration must be given to the engine. The great majority of British chassis have the engine and gearset mounted separately, suspended either from the main frame or from a sub-frame. This popularity of the separate mounting is explained by the fact that many makers have as yet made no fundamental changes in their pre-war design, since approximately forty of the real post-war cars have unit powerplants. Lanchester has always embodied this principle and continues it, other adherents now including Angus Sanderson, Austin and Phœnix, the latter on a

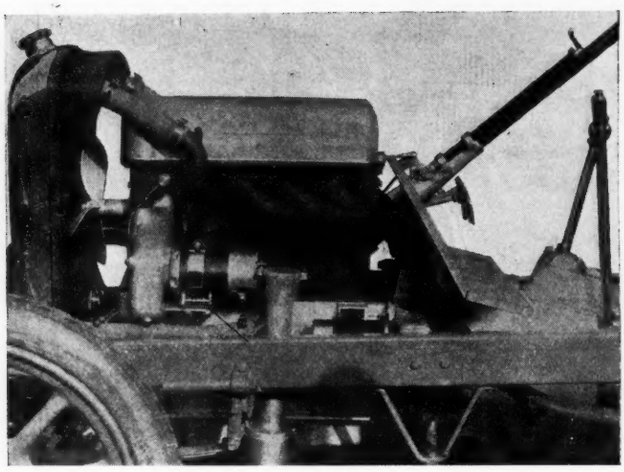

Seabrook magneto mounting; armature shaft vertical above driveshaft of overhead camshaft. Stay between radiator and dashboard rotates for ignition timing control
Head gasket serves to retain compression only on new Crossley. Sketch shows type of rubber joint ring for water passages
Humber flexible disk of magneto coupling is separate unit with eyelets for pegs projecting from driving and driven plates
Details of Sunbeam radiator blind, operated by wire connection from dashboard.
Wolseley Fifteen drive for overhead camshaft and oil pump. Note spring plate coupling for vertical shaft
Crossley cast-iron lanterned piston on new 20 H.P. model
Humber Fifteen radiator support from bracket at front of crossmember.

Sketches of some outstanding features at the Olympia show

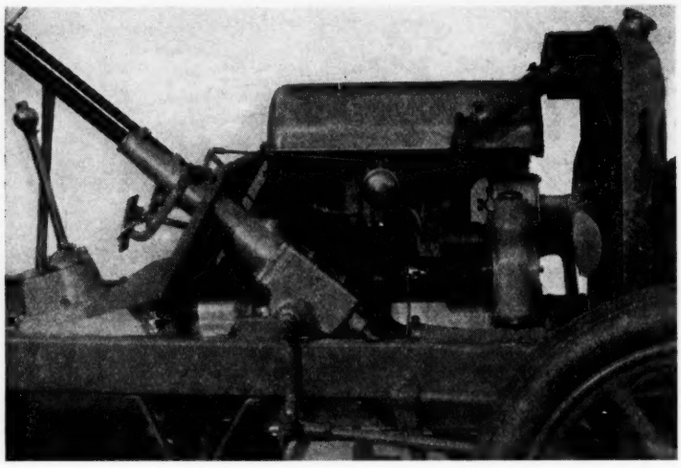
new model just introduced. On the other hand, post-war chassis which have separate units include Wolseley (15 hp.), Napier, Standard, Straker Squire, Armstrong-Siddeley and Crossley.

The separate engine is supported at either three or four points by the main frame, while the gearset is slung from two cross members; but in some instances, Star for example, a short sub-frame is used for the gearbox alone. When the unit powerplant arrangement is adopted, there is usually an open clutch pit, as in the Arrol-Johnston, 10-hp. Humber, Angus Sanderson and the new Phœnix. There are three or four examples (Swift is one) of engine and gearset carried by extensions of the lower web of the main frame.

Neither with the unit system nor with the separate engine and gearset is there any general endeavor to provide a flexible three-point suspension, and this is the case whether or not a sub-frame be used for the separate units. The Guy is a notable exception in the latter class, for the sub-frame which carries engine and gearset has a spherical trunnion bearing at the front and is supported at the back by two hanging brackets swinging on the tubular cross member and having spherical joints at their lower end where the sub-frame is secured. This chassis, it may



Unit powerplant of Beardmore Eleven with overhead camshaft. Note dual water outlets from cylinder head to radiator. Bore stroke 2 11/16 x 4½ in.



Beardmore Eleven (2 11/16 x 4½ in.) has overhead camshaft and unit powerplant with central control. Gearset provides four speeds. Note pilot flange fixing of magneto

be recalled, is the only one of British manufacture which has an eight-cylinder V type engine. It was introduced for the first time at last year's show.

Number of Cylinders

There has been only one addition to the number of British cars with eight cylinders, the Leyland eight-in-line. The four-cylinder block cast engine is still in the vast majority, and, so far as proportionate numbers go, it has increased in favor since last year, some 70 per cent of British engines of all sizes having this number of cylinders, as compared with 66 per cent last year. Sixes appear to have lost ground, but actually no six-cylinder engine which appeared last year has been discarded, and the anomaly is due to the larger number of new models introduced in the interval with four or two cylinders. The two-cylinder engine is increasing, but naturally only in respect of small runabouts, of which quite a number are now on the market. The three-cylinder radial engine is again only represented by one make, the Cosmos of the 1919 show having dropped out and has its place taken by a newcomer. The five-cylinder radial, represented last year by the Enfield-Allday, no longer exists, for this maker has now gone back to a four-cylinder block water-cooled type, though the designer of the five-cylinder is organizing to produce it on his own account.

Cylinder Construction

For four-cylinder engines the block casting is almost, but not quite, universal. Strangely enough, one of the most notable exceptions, Singer, has a very small engine with a bore and stroke of 2½ x 3 7/16 in., while another exception is a newcomer, the Blackburn. Cylinders cast in threes are general for sixes, though Straker Squire and the new Sheffield Simplex have six single cylinders, and a new make yet to establish a reputation, the Ryner Wilson, has a block cast six.

Detachable heads have appreciably increased, and are now practically equal in number with the integral heads, though if side valve engines were considered apart from those with valves in the head, the integral construction would predominate appreciably.

It is to be remarked that the system of casting cylinder block and upper half of the crankcase as a unit in detachable head engines is not increasing, the majority of new detachable head engines having a two-part aluminum crankcase. The Rover is an example of this arrangement, also the new Crossley, two Beardmore models, the new Standard and the 15-hp. Wolseley.

Valve Position

Side valves appear to have gained ground, but this does not infer that any maker has discarded overhead valves. It implies that the majority of new makers and others with new models have preferred the L head cylinders. The only new valve-in-the-head engines of note are the Standard and Leyland, the first having pushrods and the other an overhead camshaft. Superimposed valves are used in only 3 per cent of British engines, and these made by firms of no very wide repute.

In overhead valve engines, the overhead camshaft and the push-rod systems are equally popular. Wolseley, Bentley, Lanchester, Napier and Beardmore (one model) are among those using the former, while Armstrong-Siddeley, Albert and Standard prefer push-rods. Where the latter appear they are almost invariably enclosed, either in passages through the cylinder block or, as in the Armstrong-Siddeley, in tubular casings. In either case the push-rod passages serve to return surplus oil from the overhead gear to the crankcase. As last year, only one maker has an overhead camshaft acting directly upon the valve stems; this is the Dawson, one of the high-grade small cars, which has a four-cylinder 2¾ x 4¾ in. engine.

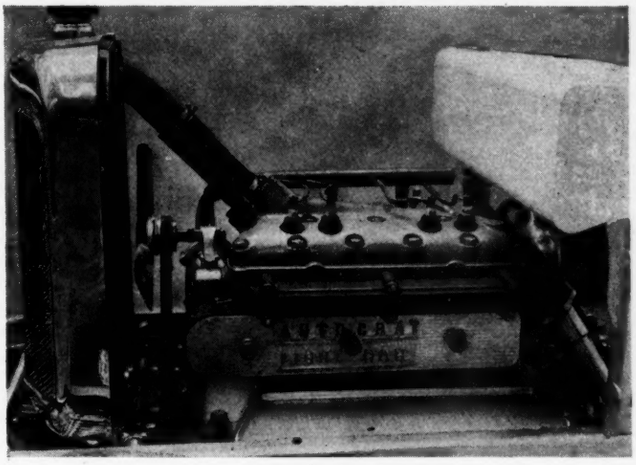
Daimler, of course, is still using Knight sleeve valves, and a new Argyll again has the single sleeve on the Burt-McCullum system. The only unusual poppet valve systems are in the eight-cylinder Guy with valves at approximately 40 deg. from vertical, and Horstmann with horizontal valves resembling the Duesenberg in method of operation.

Crankshafts

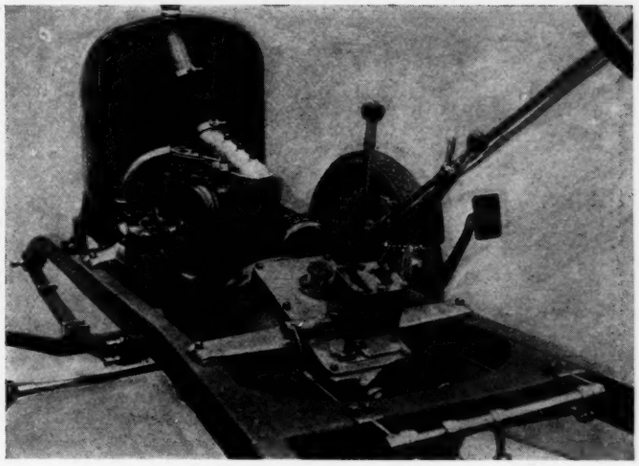
For four-cylinder engines, the five-bearing crankshaft is exceptional. Vauxhall, Austin and Crossley have five, the latter in the 25-30 hp. model (4 x 5½ in.), but in the new four-cylinder 3½ x 5⅞ in. engine of this make three bearings only are used, the latter being current practice for engines about 100 cu. in. capacity, while two bearings are more general in smaller sizes.

For the higher-grade sixes seven crankshaft bearings are preferred, as in Rolls-Royce, Straker-Squire and Lanchester; but three bearings are not unknown, as witness the Armstrong-Siddeley.

Anti-friction bearings have appeared in some of the smallest engines; for example, the 12-hp. two-cylinder air-



Autocrat detachable L-head engine (2¾ x 4) has valve cover plate extended to enclosed cross shaft drive. Aluminum brackets for gravity fuel tank and sloping footboard



High grade light car powerplant, new 10-hp. Cluley with bore and stroke 2 7/16 x 4 5/16. Sells at $2,500 with two-passenger body

cooled A.B.C., which has ball journal bearings and roller big-end bearings. The die-cast white-metal liner has lost ground appreciably, and 80 per cent of engines have phosphor bronze shells with white metal lining, trouble having been experienced with die-cast white metal breaking up. Straker Squire and Talbot run the white metal direct into the big ends and caps of the connecting rods.

There is no general move toward counter-weighted crankshafts, though a small proportion of post-war fours are so provided. Dorman, for instance, uses integral counterweights on a two-bearing shaft with 2¾ x 5⅛ in. cylinder dimensions; the new 3½ x 5⅞ in. four-cylinder Crossley has bolted-on counter weights with a three-bearing shaft, and Ryner Wilson has them on a six-cylinder three-bearing shaft. But there is nothing new in principle to be seen in this connection.

Connecting Rods and Pistons

The tubular connecting rod is exceptional, Armstrong-Siddeley being among the few users of tubular rods, but the latter do not serve to convey oil to the piston pins.

The ratio of connecting rod length to stroke varies from approximately 2 to 2.3. Wolseley is an example of the former and Arrol-Johnston the latter, with strokes of 5⅛ in. and 4¾ in. respectively.

The number of cars making use of cast iron pistons has increased compared with last year. Aluminum pistons are, however, favored by many of the best known makers and those who aim at high efficiency in power development or refinement in running, among them Lanchester, Napier, Rolls-Royce, Straker-Squire and other firms turning out high-grade cars. When aluminum is used, the slipper type of piston is frequently preferred and appears to be far less prone to piston slap than the straight-sided pattern. The split skirt straight-sided type as used by Humbers and one or two other makers has almost entirely eliminated piston slap by means of the expanding cast iron ring located in a groove within the skirt.

Cast iron pistons are almost invariably straight-sided, though both the new Crossley and the Phœnix have a lantern pattern, the skirt being cut away in the one case and recessed in the other at each side below the piston bosses, though the normal shape of the skirt is resumed at the lower end to accommodate a scraper ring.

Scraper rings in the skirt, however, are not prevalent and occur in only seven makes, the usual ring arrangement being three rings in the crown, with the groove of the lower one beveled off and having small holes drilled through to the interior, thus enabling this bottom ring to serve a double purpose by assisting to retain compression and acting as a scraper.

Two compression rings as a rule are found only in engines of 12 hp. and under, though there is no standard in this respect, for while the 20-hp. Ruston-Hornsby has only two rings the 12-hp. Morris-Oxford has four. The latter number is, nevertheless, exceptional, appearing in only eight different engines. But Rolls-Royce goes still further and uses six, while the new Phœnix has three arranged in one groove in addition to the scraper ring in the skirt already referred to.

Steel pistons represent only 3 per cent of the total, the same as last year, but a combined aluminum crown and cast iron skirt pattern appears in a newcomer—the six-cylinder Ryner Wilson.

Prior to the war it was almost invariable British practice to fix the piston pin in the piston bosses, allowing it to oscillate in a bronze bush in the connecting rod small end; but while this is still the practice in the majority of British engines it has been displaced by the floating piston pin and that fixed in the connecting rod, in 28 and 20 per cent of engines respectively. The usual method of preventing the floating pin from scoring the cylinder walls is to fit plugs of brass, but Armstrong-Siddeley and one or two others turn a groove within the piston boss at each end and locate the piston pin by means of wire rings sprung into the grooves.

Engine Lubrication

The hollow shaft engine lubrication system has gained adherents during the past twelve months, but proportionately to the number of different makes it has lost ground. Most of the recently introduced cars have a modification of the trough system, wherein separate leads are taken to each main crankshaft bearing, and, when a silent chain distribution is used, to a point whence a stream of oil is delivered on to the inner side of the chain. The Wolseley overhead camshaft models have an arrangement of this nature, troughs being used for the big-ends and direct leads for the main crankshaft bearings, the timing gear and the camshaft and rockers.

The hollow shaft system is found on all sizes of car from 10 hp. upward, and its use on small machines is somewhat surprising in view of the success which has accompanied the trough system. The latter is undoubtedly

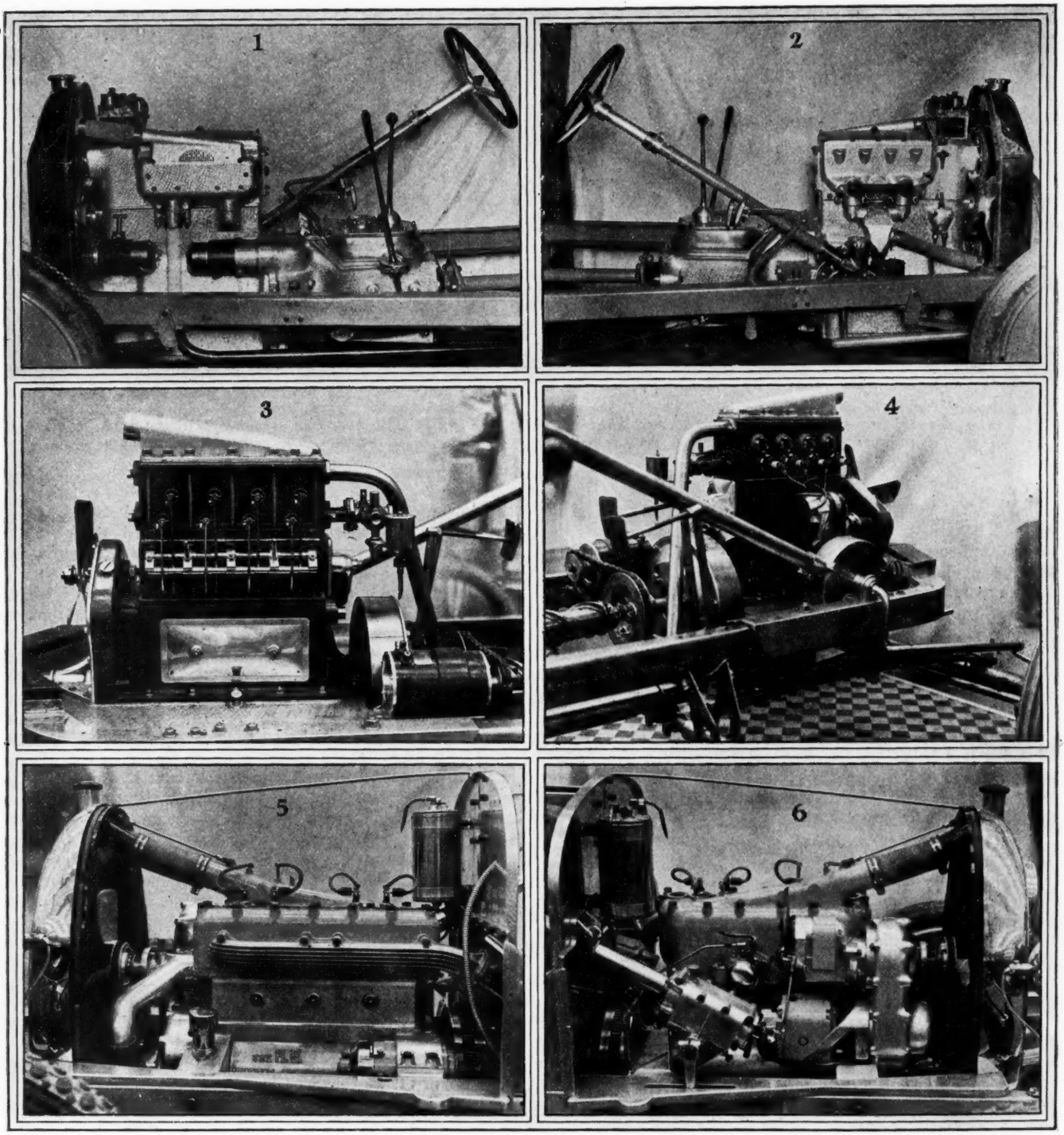


Fig. 1—Left side new Seabrook overhead camshaft engine. Aluminum cylinder block and head; latter has bronze valve seats cast in. Unit gearset provides four speeds. Chassis designed for light "sporting" bodies and introduced by late British agents for Regal cars. Fig. 2—Right side new Seabrook (British) "sports" car which has aluminum cylinder blocks with cast iron liners, overhead camshaft and magneto with armature vertical coupled to top end of camshaft drive. Thermosyphon circulation via jacket of induction manifold. Bore and stroke, 2¾ x 4¾ in. Fig. 3—Left side horizontal valved Horstmann with cover plate removed. Direct-drive fan with friction clutch in boss. Fig. 4—Right side Horstmann engine (2 9/16 x 4⅜ in.) with horizontal valves; exhaust above inlet. One of isolated examples of front cantilever springs. Fig. 5—Left side H. E. engine (3 x 4¾) has belt-driven combined fan and pump; belt adjustment by movable rear flange of fan pulley. Fig. 6—Right side H. E. engine, showing superimposed chain-driven magneto and generator. Bore and stroke 3 x 4¾ in.

cheaper to install, and there has been no clamor for the hollow shaft arrangement on the part of users and prospective buyers.

One light car which has the forced system throughout is the new 12-hp. Standard, for, in addition to a drilled crankshaft and leads to the timing gear, overhead rocker shaft, and through each rocker to the socket of the push-rod, it has copper pipes attached to the connecting rods and leading to the piston pins. On the other hand, the Armstrong-Siddeley, a much larger engine with six 3½ x 5¼ in. cylinders, lacks the direct feed to the piston pins which, with the pistons, depend upon splash.

In addition to the direct feed of oil to silent chains some examples occur of a trough formed at the bottom of the timing casing to insure that the chain runs in a bath of oil to supplement the direct feed, the trough overflowing into the crankcase.

Oil Pumps

The great majority of British engines have oil pumps of the gear wheel type located in the sump and driven by skew gearing and a vertical shaft from the camshaft; but some makers still continue to mount the pump at the rear end of the camshaft, usually with an exterior suction pipe. In such cases it is usual to provide facilities for priming the pump, which is generally necessary each time the sump is drained.

Filters

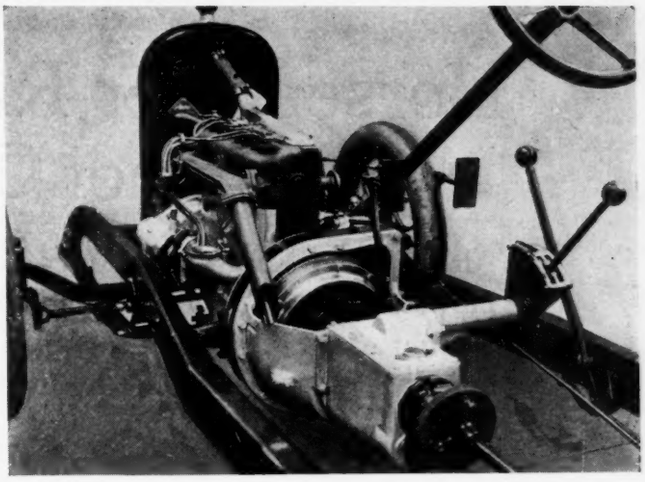
Filters of fine mesh gauze and of considerable area are more frequently used than hitherto, arranged well above the oil level in the sump, so as to permit their being removed and cleaned without waste of lubricant, but despite protests from users on this score the main filter is usually found within the sump, generally a cylinder of gauze surrounding the oil pump. This not infrequently implies a necessity of removing the sump—draining it, at all events—before the filter can be reached, a procedure which may call for the detaching of an underpan as a preliminary. Makers, in their instruction books, especially the makers who have adopted hollow shaft lubrication, lay great stress upon the necessity for keeping the oil filters clean, and while they are undoubtedly right in giving this advice and emphasizing it, one would imagine that they would endeavor to assist users to follow it by placing the filter where it could be detached and cleaned in a few minutes instead of, as is now frequently the case, this work occupying anything from half an hour to three hours. Crossley attains the desired end in the new model by providing a check valve which closes as the filter is withdrawn from the sump and thus prevents the loss of oil.

Cooling

Air-cooling has made no advance whatever since last year. It is not used on other than small cars having two or three cylinders at most. Actually the largest air-cooled British engine is a three-cylinder radial with a bore and stroke of 3 x 3½, fitted to a light car as yet unknown to fame—the Rubery-Lindsay. Nevertheless, air-cooling has proved very successful among the "small fry," and especially is this so in the case of the 8-hp. Rover which was introduced last year to supplement the 12-hp. water-cooled model, and has a horizontally opposed two-cylinder 3⅝ x 3 7/16 in. engine. This engine has no fan to induce a draught, the passage of the vehicle through the air being relied upon, though, in addition to the perforated metal sheet which forms a dummy radiator, air scoops are fitted to the sides of the hood to direct a draught upon the cylinder heads.

The Rover engine follows very closely upon motorcycle practice, and was criticised upon its introduction as being likely to overheat very readily; but actually it has failed to exhibit any signs of distress, even on long hills of 10 per cent grade climbed in the height of summer. Among the cars of popular price the 8-hp. Rover may be said to be the most favored and to have the largest output, approximately 20 chassis per week.

In regard to water-cooling systems, the thermosyphon and pump circulations are as near as possible equal in favor. The plan of using, in thermosyphon systems, a belt driven water accelerator arranged at the front of the cylinder jacket and coupled to the rear end of the fan shaft is not increasing, the latest introductions indicating a reversion to a positively driven pump worthy of the name; that is, in cases other than those in which thermosyphon pure and simple is adopted.



Unit powerplant of 15-hp. Belsize. Crankcase and clutch pin bolted to rear supporting member, a ring forging with separate arms to main frame

The water accelerator has by no means proved to be entirely satisfactory. As a rule it is decidedly inefficient as a pump if it is to allow, as it is intended to do, thermosyphon circulation to occur when the impeller is stationary. Where the accelerator is of any pronounced effect in circulating the water when driven at its normal speed, overheating is encouraged by intensifying the effect of fan belt slip, for with one exception—a Dorman engine—the same belt is used for both fan and accelerator shaft.

Thermosyphon cooling without an accelerator is used on engines up to 3⅛ x 3¾ in., of which the Arrol Johnston and the Beardmore are examples, while the assisted thermosyphon occurs on engines up to 30 hp., for example, the 3⅞ x 5⅞ in. Vauxhall. In respect of the last mentioned car it must be admitted that no complaints have been heard concerning the belt drive for the pump, and the criticism put forward concerning the inefficiency of accelerators generally does not seem to apply to it. It may be that many other makers endeavor to economize by fitting too narrow a belt. But whether that be so or not, there can be no question that users look upon belts for any purpose as a nuisance and are only half satisfied to put up with one for a fan drive.

There is another objection to the combined fan and water pump, belt driven. The belt cannot be adjusted by any recognized means unless another unit is driven by the same belt, making a triangulated drive, which is obviously undesirable. Actually the belt adjustment is nearly always provided by the latter method, the additional unit being the dynamo, which can be moved to and fro on its bracket. An exception is on the Horstmann, a British car with a very limited output; in this case, the belt is tensioned by means of an adjustable flange on the fan pulley, an arrangement which also appears on a British truck chassis, the A. E. C. It need hardly be said that V belts are used in both, in fact, rarely on British cars does one find any other type—the leather link V belt is practically universal.

Ignition

Battery systems of ignition have made no advance since last year in proportion to the total number of cars on the market. In fact, the magneto has a still greater lead,

(*Continued on page* 1067)

Horsepower Ratings for Tax in Other Countries

Almost every European country has its own horsepower formula for the purpose of calculating the annual tax on automobiles. Some take account of the cylinder bore only, others of the bore and stroke and still others of these factors and the maximum engine speed.

By P. M. Heldt

EXPORTERS of automobiles are considerably annoyed by the fact that the ratings of automobile engine horsepower for the purpose of taxation are different in the various countries. The tax rating is supposed to represent the horsepower available at the wheel rims, and usually is only about one-half of the maximum output of which the engine is capable. As the horsepower tax, in any case, is an obstacle to the sale abroad of American cars, which are usually powered considerably above the foreign average, it is well for our exporters to be familiar with the formulæ by which the tax horsepowers are calculated in different foreign countries.

In France the Central Automobile Commission calculates the tax horsepower by means of the equation

$$HP = K\,n\,D^2\,L\,w,$$

In which n is the number of cylinders of the engine; D, the cylinder bore in centimeters; L, the piston stroke in centimeters; w, the maximum engine speed on the road in r.p.s.; K, a constant having the following values:

0.00020 for single cylinder engines
0.00017 for two cylinder engines
0.00015 for four cylinder engines
0.00013 for engines of more than four cylinders.

The above equation is applied to all four cycle engines. When the formula gives a fractional result, the next higher integral number is used for calculating the tax. In the case of two cycle engines the representatives of the Bureau of Mines, which, strangely enough, controls automobile taxation in France, will evaluate the horsepower according to the information at their disposal.

In the above formula the only uncertain value is w, the maximum engine speed under road conditions. A road test is made of each model brought out by manufacturers and presented for admission to circulation on the public highways, and from the maximum speed achieved, the wheel diameter and gear ratio, the maximum engine speed is calculated.

Translated into English measures, the above formula becomes

$$HP = K\,n\,d^2\,l\,s,$$

where n is the number of engine cylinders; d, the cylinder bore in inches; l, the piston stroke in inches; s, the maximum engine speed in r.p.m.; K, a constant having the following values:

0.0000546 for single cylinder engines
0.0000464 for two cylinder engines
0.0000409 for four cylinder engines
0.0000355 for engines with more than four cylinders.

In Germany the following tax formula is used:

$$HP = 0.3\,i\,d^2\,s,$$

in which
i = number of cylinders
d = bore in centimeters
s = stroke in meters.

Changed to English measures this formula becomes

$$HP = 0.0492\,i\,d^2\,s$$

where
d = bore in inches and
s = stroke in inches.

In Italy use is made of a horsepower formula based solely on the cylinder bore and on the number of cylinders, but the constant used in the formula is different for commercial vehicles than for passenger cars. The passenger car engine tax horsepower formula is

$$HP = 0.0525\,n\,D^2$$

and the commercial vehicle engine tax horsepower formula,

$$HP = 0.035\,n\,D^2,$$

n being the number of cylinders and D the cylinder bore in centimeters. In English measures these formulæ become

$$HP = 0.338\,n\,D^2$$

and

$$HP = 0.225\,n\,D^2.$$

To show the results given by these different formulæ let us take a six cylinder 3½ x 5 in. passenger car engine operating at a maximum speed of 2400 r.p.m.

This would be rated in France as a

$$0.000025 \times 6 \times 3.5 \times 3.5 \times 5 \times 2400 = 31.3 \text{ hp.},$$

in Germany as a

$$0.0492 \times 6 \times 3.5 \times 3.5 \times 5 = 18.1 \text{ hp.},$$

and in Italy as a

$$0.338 \times 6 \times 3.5 \times 3.5 = 24.85 \text{ hp.}$$

By the A. L. A. M. formula, mostly used for taxation purposes in this country, the horsepower of this engine is

$$\frac{6 \times 3.5 \times 3.5}{2.5} = 29.4 \text{ hp.}$$

In Belgium automobiles are taxed according to the following equation for horsepower—

$$HP = K\,(d^2\,C\,N\,n),$$

where K is a constant whose value ranges from 3 to 3.5 for motorcycles and from 4 to 4.5 for other vehicles; d, the cylinder bore in meter; C, the piston stroke in meter; N,

the number of cylinders and n the r.p.m. It is customary in determining the tax rate for motorcycles to place $K = 3$ and $n = 1000$ and for automobiles, $K = 4.5$ and $n = 1000$.

In Sweden the tax horsepower formula reads as follows:

$$HP = \frac{z\,d^2\,s\,n}{c},$$

where z is the number of cylinders; d, the bore in cm.; s, the stroke in cm.; n, the normal speed of revolution (r.p.m.), and c a constant which is taken at 180,000 for two-stroke motors burning either gasoline or kerosene, at 220,000 for four-stroke motors burning gasoline, and at 240,000 for four-stroke motors burning kerosene.

Spain has a simple formula, to wit:

$$HP = 0.0007\,nd^2,$$

where n is the number of cylinders and d the bore in millimeters.

Japan employs a formula very similar to the A. L. A. M. formula in use in England and the United States; it reads:

$$HP = \frac{D^2\,n}{3},$$

in which D is the cylinder bore in inches and n the number of cylinders.

Finally there is Hungary, which also has tax horsepower formulæ of its own, not only for gasoline but also for electric automobiles. The gasoline car formula is

$$HP = \frac{i\,d^2}{20},$$

where i is the number of cylinders and d the bore in cm. Electric vehicles are rated by the formula

$$HP = \frac{K\,G}{8},$$

where K is the weight of the fully loaded vehicle in metric tons and G the speed on level roads, in kilometers per hour.

Tendencies in British Engine Design Noted at Olympia

(*Continued from page* 1065)

being used on nearly 90 per cent of cars, with battery and magneto together on an additional 5 per cent. The only new adherents of the battery system are Leyland and Morris, though in the case of the latter the magneto occurs on one model. Wolseley still includes battery ignition in the specification of two models, the 10-hp. and the 15-hp., but has actually been using the magneto on many of the cars turned out up to the present.

Evidently it is expected that battery ignition will become more widely used, for it is to be noted that a large proportion of the electrical equipment manufacturers—C. A. V., Smiths and Rotax, for instance—are putting forward a dynamo battery system, and it is to be surmised that they would not have made the outlay involved unless they had some kind of assurance that there would be a market for an ignition outfit of this type. On the other hand the new Phœnix was planned for dynamo-battery ignition originally, but the sales department feared that prospective buyers would object, so a magneto has been installed instead.

Distribution

The silent chain drive for the camshaft and magneto is far and away the most popular among British manufacturers. As often as not, however, it has no means of adjustment, the percentage in which the latter occurs being practically identical with that of the non-adjustable chains. Swift, in one model, uses an idler pinion for adjusting two distribution chains simultaneously, the bracket holding this pinion being movable in either one or other of two directions. But the most usual form of chain adjustment, where it is provided, consists of a magneto bracket which can be moved away from the engine center line and carries integral with it the magneto driving sprocket and shaft bearing. Austin and Standard are two firms who adopt this arrangement, which obviously removes the necessity for shifting the magneto on its base when the chain is adjusted.

Next to chain drive, skew pinions are most favored for the distribution, the straight pinion having receded in favor of both chain and skew gear. Worm drive is used in the Ensign throughout for operating the overhead camshaft, and also by Lanchester at the top end of the vertical drive shaft. The Wolseley camshaft is driven by silent chain and two pairs of bevels on vertical shafts with a flat spring steel coupling bar between the two, thus affording a slight degree of flexibility in the drive.

(*To be continued.*)

Method of Applying Tar in Road Repairs

IN a paper entitled "Economies in Road Maintenance," which was recently presented to the Institution of Municipal and County Engineers, J. Lang, county road surveyor, Kilmarnock District of Ayrshire, states that the tar-spraying of roads, especially in populous areas, is always a source of annoyance and discomfort, owing to the difficulty in keeping pedestrian and vehicular traffic off the newly tarred surface until it has been covered with chippings. Several methods for carrying out the spraying and chipping in one operation have recently been introduced, and the system adopted in the author's district is as follows:—A 5-ton tractor hauls a 320-gallon tar tank to which is attached a 5-ton tipping wagon filled with chippings. A flexible pipe is led from the tar tank and coupled to a sprayer fixed to the bottom of the wagon and behind the rear wheels. A V-shaped trough is placed under the back door of the wagon. The opening in the bottom of this trough can be regulated to suit the size of chippings in use. To prevent choking, a tube or shaft—with projecting spikes driven by a chain from the hub of the rear wheel—runs through the trough. A 6-ton load of chippings covers from 700 to 900 superficial yards, or 350 to 450 lineal yards by 2 yards wide, and the spraying and chipping is carried out at a speed of 4 miles per hour. Apart from the saving in labor, which is considerable, the chippings are spread more uniformly than can possibly be done by hand.

RECENT progress in gasification processes are said to have made it possible to obtain out of the 30 million BTU's in a ton of coal, 8 to 9 millions in gaseous products, 3½ millions in liquid products and 15 millions in the coke.

German Developments in Radiator Construction

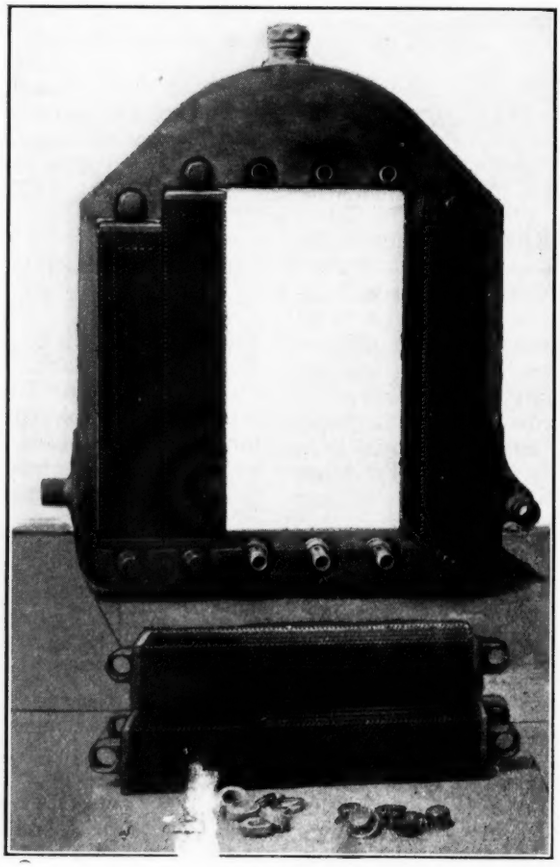
Radiators with sectional cores have come into use in Germany during recent years. This type made the repair of damaged radiators a less difficult proposition, since the core consists of a number of vertical sections, which can quickly be replaced. Little brass is needed in the construction.

By Benno R. Dierfeld

THE disadvantages of the usual radiator constructions with solid soldered core are well known to every driver: A damaged radiator in most cases prevents the continuation of the journey; repairs at the garage can be carried out by the driver only with difficulty, with considerable loss of time and with special tools which are not available. The difficulties of radiator repairs at home are usually such that the damaged radiator will be returned to the factory and the car meanwhile stands idle.

For the above reasons radiators with sectional cores have come into use in Germany during the past several years. The core of the S.K.F. radiator, built by the Sueddeutsche Kuehlerfabrik Feuerbach, consists of a number of vertical sections, which, if damaged, can be quickly replaced. It has a shell of pressed steel with the usual upper and lower water tanks; the sections are attached to the tanks in such a manner that shocks or jolts on bad roads and resulting weave or distortion of the car frame do not cause leaks at the joints. Every section comprises two flat headers, at the upper and lower end, respectively, which are joined by the tubular radiator section. Upper right illustration on opposite page shows the patented joints between the header and the tank. The latter is provided with recesses into which the headers *b* of the sections are inserted. The headers of the sections have conical depressions on both sides, into which fit the conical rubber packing rings *f*, which are unaffected by heat. These packing rings are tightened up by hollow screw bolt *e* and cap nut *g*. The hollow screw bolts have central openings for the passage of the water.

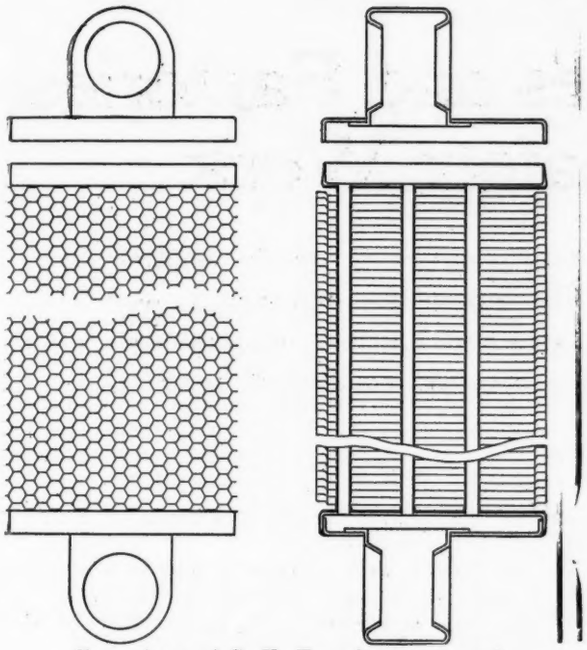
The advantages of this radiator design are that very little brass is needed for its construction, and that there is only a small number of soldered joints; if one or two sections are damaged by collision, etc., it is only necessary to unscrew the two cap nuts *g* to pull the section with its packing rings out. In case a spare section is carried along on the car, it can be put in place immediately; otherwise, the openings of the tanks are closed by special caps. The individual parts of the radiator sections are standardized, and therefore are interchangeable. This radiator is made in three depths of core, viz., 100, 115 and 130 mm. (3.94, 4.53 and 5.12 in.) and the length of the section, measured between the cap nut centers, is standardized in a series of sizes ranging from 300 mm. to 1000 mm. in steps of 50 mm.



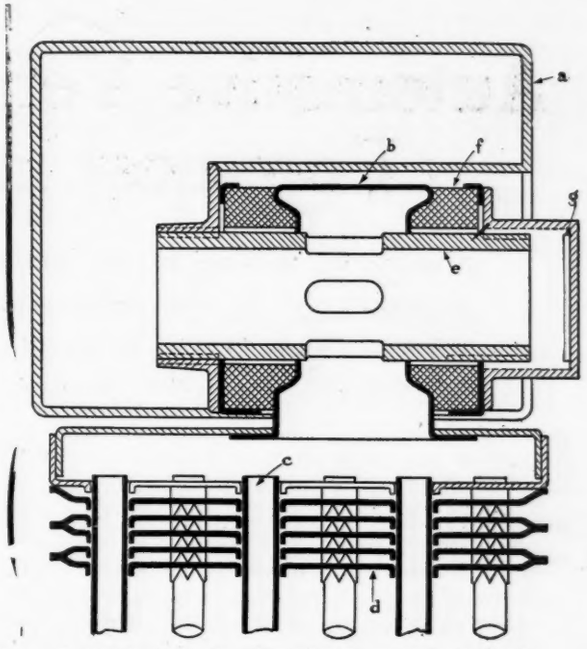
S. K. radiator and sections

Brass and tin, the principal materials of construction used in automobile radiators, are very scarce in Germany and correspondingly expensive, since both copper and tin have to be imported. Other materials therefore are needed for this purpose; that is, materials of native production. Aluminum and galvanized sheet iron are suitable. German war experience showed that it is possible to build serviceable radiators from both materials, when proper precautions are taken to prevent electrolytic action. The electric currents dissolve the electrolytically negative metal, so that cracks or leaks soon occur at the weakest spots. For instance, in brass radiator cores the brass sheet near the soldered joints is weakened by galvanic action and its structure is so changed that it cannot be soldered again, but disintegrates when subjected to the least stress. The water passages of the radiator core are then clogged by scale deposit to such an extent that the core often becomes unserviceable and must be exchanged. Only in the case of brass-tin radiators subjected to severe mechanical stress, as, for instance, farm tractor radiators, does mechanical injury become apparent sooner than injury from electrolysis.

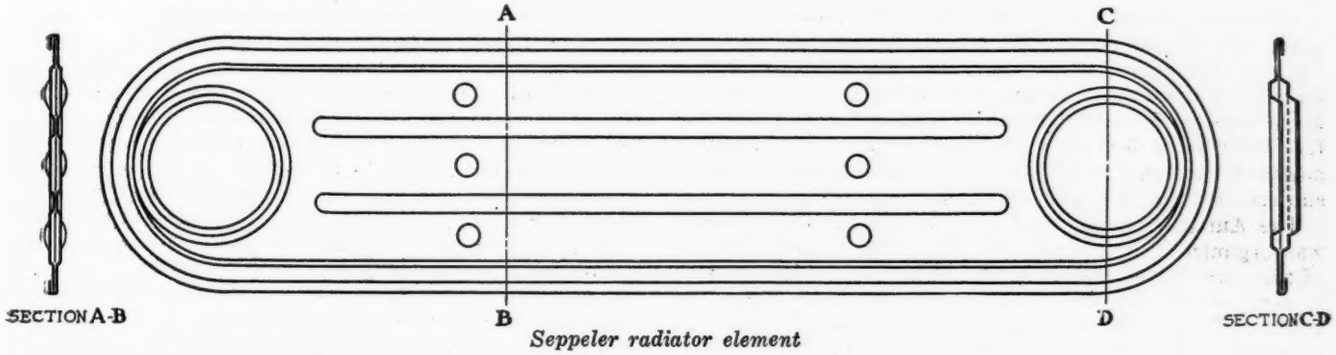
Aluminum, which can be produced in Germany in great quantities, protects itself automatically against extraneous influences by forming a layer of oxide. However, when



Two views of S. K. F. radiator element



Joint of S. K. F. radiator section to tank



Seppeler radiator element

aluminum is used in contact with other metals, iron, for example, the oxide layer is dissolved electrolytically with the production of hydrogen, and then the aluminum is quickly destroyed, even if of considerable wall thickness and used with relatively clean water. Aluminum, therefore, must be used together only with such metals as are galvanically negative toward it, which will preserve the oxide-layer. Another plan consists in using only aluminum in the construction. All parts of the radiator in contact with water then consist of aluminum, and the aluminum radiator is separated from the engine, etc., by a rubber hose or pads and packings of insulating material. Experience has shown that such radiators are sufficiently foolproof and have a very low weight, so that they are specially adapted for fast passenger cars.

The building of such radiators is very difficult, because aluminum of such fine thicknesses cannot be readily soldered. Therefore, in 1914 the German engineer Seppeler produced radiator cores without soldered joints using stamped and folded sheaths. These radiator sheaths can also be manufactured of iron. The individual sheaths are assembled with packing rings on two horizontal perforated tubes, that allow the passage of the cooling water. The core is held together by the case. This design has the advantage, that damaged or leaky sheaths may be exchanged or the whole core can be replaced, if obstructed by scale deposits.

As above mentioned, these radiators may also be built up of sheet iron. Now iron, in contrast to aluminum, is destroyed very quickly by rust, consequently all its surfaces in contact with water or moist air must be effectively rust-proofed. The most suitable protection consists in galvanizing or zinc-coating, because the electric tension between the zinc and iron causes a protective layer of hydrogen on the iron and thus prevent rusting. If the iron is tinned the electric potential between it and the tin would be reversed, and oxygen causing corosion would be liberated.

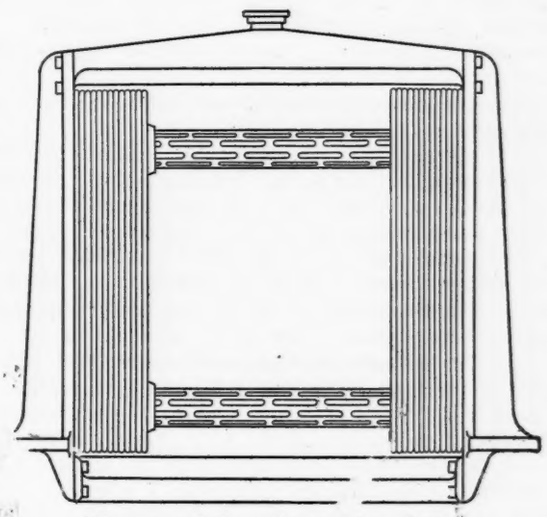


Diagram of Seppeler truck radiator

Automotive Vehicles and Factories Foremost in Safety Work

The recent meeting of the National Safety Council is merely another argument as to the importance of the automotive industry in our national life to-day. The factory delegates found they were interested in all sessions, and traffic questions were paramount in general sessions.

By C. A. Briggs*

THE Ninth Annual Congress of the National Safety Council, which recently convened in Milwaukee, considered a number of subjects of interest to the automotive manufacturer. In fact, there was scarcely a session of the twenty subdivisions, into which the congress was divided, that was not of more or less interest to the automotive industry.

Delegates from automotive plants found it somewhat of a problem to decide whether to attend meetings of the Metal Section, Engineering, Woodworking, Electrical or Public Safety, all of which considered problems that were vital to those who were there primarily to attend the meetings of the Automotive Section. The meetings were so scheduled, however, that one could map out a very helpful group of subjects without serious confliction.

The Automotive section of the National Safety Council was organized three years ago, when the annual meeting of the council was held in New York City. It has attained a very creditable growth and influence and to-day the section acts as a clearing house for the industry on matters of safety and other information.

The officers elected for the ensuing year are: Chairman, Robert A. Shaw, Ford Motor Co.; vice-chairman, A. L. Kaems, the Simmons Co.; secretary, R. F. Thalner, Buick Motor Co.

One of the most interesting sessions of the automotive group was the one devoted to the discussion of the power press. This subject was very ably handled by the vice-chairman-elect, A. L. Kaems. Realizing that the best way to get anything across is by the way of demonstration, he fortified himself with the generous number of power press dies which he used in convincing his audience that the punch press problem was one of proper tools and arrangement of dies, rather than costly equipment of guards. In demonstrating the use of chutes and slides, some very intricate parts were made to travel down to the dies, where an operation could be performed with absolute safety to the operator.

The rather extensive exhibit of dies and pieces of stock formed on them were later transferred to the main safety exhibit, where it attracted considerable attention.

The session devoted to the discussion of circular saw guards was profitable, as every automobile plant has been harassed by the question of how to guard saws and when to guard them.

A new idea was advanced here by Henry Scheiber of the Wisconsin Industrial Commission, who stated that a large percentage of the circular saw hazards could be eliminated by keeping the saws sharp. In this statement he had the support of several experienced wood shop men. They nevertheless advocated the use of a practical guard along with a correctly filed saw.

The Automotive section plans to take an active part in the formation of the new National Safety Codes. In particular are they interested in the code relating to machine belt guarding.

It is the opinion of various members of the section that the State laws, as adopted in some sections of the country, are too exacting in requirements, basing their contention on the remarkably small number of serious accidents that are reported from belts. Several large concerns, having kept an accurate record of belt accidents, find them so few and so trivial that they would like to be relieved from the necessity of spending so much money and material on their protection when there are larger hazards that they could remedy with far more success in reducing accidents. Some state inspectors have stressed belt guarding to a point that is ridiculous and have neglected far more fruitful fields.

It is entirely probable that the new safety codes will have something new on belt guarding as well as on other problems of vital interest to the automotive manufacturer.

It was noted that men from the automotive industry took an active part in the discussions in the Public Safety Division. In particular were they interested in some of the laws that were suggested, many of them being considered quite drastic, especially those relating to traffic regulation.

One bright light was thrown across the rather dark picture that was drawn of the automobile as an accident producer on the street. This was when L. J. Smith, Director of Safety, Kansas City, stated in his talk on "Traffic Problems" "that the motorist is not entirely to blame in the majority of accidents, because pedestrians not only outnumber but surpass in point of recklessness the average run of automobile drivers. Nearly one out of every hundred pedestrians are 'jay-walkers' with their minds on any other subject but taking care of themselves."

It was evident by the number of representative men from such a variety of industries that the subject of safety was being considered from more than one viewpoint these days. Of course there is the big "human interest" side, but this is no longer the one big issue. There is the economic saving to industry that carries a strong appeal, and we must admit that it is the latter that gets across first in some cases.

In a very interesting speech before the convention, Marcus A. Dow, General Safety Agent of the New York Central Lines, said: "It ought to be comparatively easy to secure the co-operation of the employer in safety work, because there is such abundant proof of its value to the employer from a dollar and cents standpoint. Figures, how-

(*Continued on page* 1076)

* Safety director of the Willys-Overland factory.

An American Manufacturer's Attitude Toward Foreign Trade

Here is a bit of very frank self criticism. It comes to AUTOMOTIVE INDUSTRIES from an executive of one of the largest car manufacturers in this country. The truth cannot be doubted and we want to add that the conclusions are sound. How does your attitude compare with this one?

YOU cannot imagine just how much good it did the staff of AUTOMOTIVE INDUSTRIES to receive the contribution printed below from an executive of one of the largest car manufacturers in this country. This firm has not always been entirely friendly toward foreign trade, but this letter goes to show that the firm has been so entirely converted to the benefit of foreign trade that they want to pass a part of the good things on to the rest of the industry. It begins to look like foreign trade might assume something of the character of a religion. We hope so. The contribution follows:

THE following I believe is typical of the average automobile manufacturer's attitude toward foreign trade, with the exception of two or three of the larger manufacturers.

The manufacturer of a well-known, high-priced American motor car, when approached by a foreign dealer with a view of opening negotiations for the sale of the car in the dealer's country, argued against the dealer's proposition, and advanced the opinion that by the time arrangements could be terminated and the dealer supplied, business in the United States would again be so good that they would not need the orders from the foreign country.

Mind you! **The manufacturer wanted the business at the time and as a matter of fact needed it to assist in bolstering up production that was low on account of a falling off in domestic demand. He seemed willing to do business with the foreign dealer, providing immediate returns were assured.** His counter proposal was that the dealer arrange to at once place orders for 50 cars for immediate shipment, guaranteeing such orders by bank deposits in New York City. This proposal was made in the face of the fact that the car was practically unknown in the dealer's country.

The manufacturer's attitude being: We are willing to do business with you to help us out of a hole, providing this business shows immediate returns, but we are not willing to wait for you to develop your market, for after business has returned to normal in the United States we will be too busy with taking care of domestic business and cannot be bothered with foreign orders.

Another Instance

Another instance came to my notice wherein a dealer bidding for the sales franchise of a high-priced American car for sale in Hong Kong and the immediate surrounding district in China was informed by the manufacturer that the manufacturer would be agreeable to considering his application providing he would agree to dispose of at least 50 cars per year.

Considering the fact that the car applied for sells in this country for between $5,000 and $6,000 and the further fact that the whole of China only has 2800 cars in use, these cars being purchased at an average export price of $1,200, it is not surprising to learn that nothing further was heard from the applicant. (This figure probably refers only to the Shanghai consular district, not the whole of China.)

The whole trouble seems to be that the American manufacturer cannot understand the viewpoint of the foreign purchaser. He is inclined to look upon the foreign purchasers as people with peculiar ideas (this probably from the reason that their ideas do not exactly coincide with his own), and he is not prone to put himself out to become acquainted with the world's markets and absorb some of the tastes and sentiments of the foreign purchasers.

The sooner American manufacturers realize the fact that the big automobile future lies in the foreign markets, and prepare themselves to take care of this trade, the better off they will be.

Looking to Future

I believe we can safely predict that within the next five years fully 20 per cent of the automobiles manufactured will be sold in countries foreign to the country of manufacture.

The following figures should be of interest:

Statistics show that we have in use in the United States one automobile to each 15 persons; while in the rest of the world there is only in use one automobile to each 1176 persons.

The foreign markets, including Canada, have only consumed a matter of 1,360,300 motor cars, including both American and foreign makes as against approximately 7,000,000 being consumed in the United States.

One must of course take into consideration that the per capita buying power of the foreign countries is not as great as in our own country, but even though we reduce the figure by 50 per cent, the balance would still be greatly in favor of the foreign market.

The important questions seem to be: Will American manufacturers as a whole make a bid for this trade; and, once securing it, will they hold it by conscientious effort?

They must not lose sight of the fact that they will soon have to combat with keen competition from European manufacturers.

This meritorious competition from Europe is already being felt and, when reinforced by a natural sentiment, as is indicated by recent laws and provisions passed by some of the British Colonies, it becomes a matter that will require our very closest attention if we do not desire it to reach a point where it will be irresistible.

One thing is certain: To seek and hold the overseas trade American manufacturers must cater to the ideas of the foreign purchasers and furnish them such refinements as appeal to the European, the Oriental and the Latin-American. In other words, we must fall in line with Euro-

pean manufacturers in this respect. We must also not lose sight of the fact that a car selling for $5,000 on our market is, after the necessary expenses of shipping, duty and profits are added, a car that sells for from $8,000 to $10,000 in the country of final disposal and purchasers paying this price for an American car surely have a right to expect the same refinements that they secure in the better class of European makes.

Slipshod methods of doing business with foreign dealers are a thing of the past, as the dealer is more independent than he has been during the past five years and fully realizes that he now has other sources of supply.

The important points are to first secure, and then through an **unexcelled service to dealers** maintain that good-will so essential to foreign transactions, and to not lose sight of the fact that domestic and foreign trade each have their own problems and the latter cannot be successfully carried on through the same channels as the former but should be a distinct and separate department of the business, and headed by one who is schooled in export problems.

Comment on the Letter

THE views expressed in the foregoing statements corroborate much that has appeared from time to time in AUTOMOTIVE INDUSTRIES. The buyer in a foreign country must be met upon his own preferences as to refinements, styles of bodies, special equipment, finish, etc., especially in the higher priced lines, of which the writer speaks. In exporting cars of this class, the American manufacturer meets squarely the European who knows how to build exceedingly well one type of car, that which embodies sport and luxury. That class is the backbone of the European automotive industry and already competition throughout the world is becoming keen on the cars selling upward from $5,000. As the months go by this competition may be expected to become keener, as even Germany may be expected to become an active factor.

The foreign buyer should always be met upon his own grounds. Foolish insistence in regard to equipment, to credits and to business customs which prevail in the domestic trade but do not hold in foreign markets may be the deciding factors that determine whether the business goes to Europe or America. At home, manufacturers have accepted the fact that the market has become one in which the buyer, not the seller, holds the keys. Recognition of the same factor in the foreign fields is being forced; the quicker it is accepted the quicker will the American manufacturers "get down to brass tacks" in their export merchandising.

Acetylene as an Automobile Fuel

DURING the war Switzerland turned to acetylene for use as a motor fuel, calcium carbide being a native product while petroleum products must be imported. Acetylene, however, has not proved as satisfactory as gasoline, for when F. Haber, a prominent German chemist, visited Switzerland in the fall of 1919 he did not find any cars running on acetylene, all having been reconverted. According to a book, "Acetylen im Automobilbetrieb," by Prof. C. F. Keel, director of the Swiss Acetylene Society, acetylene is only half as expensive as benzol when produced from carbide on the vehicle.

Haber was engaged by the German government to investigate the possibilities of acetylene as a motor fuel and he conducted his experiments on a 4 hp. stationary engine normally driving a generator, and on a Fiat 20 hp. automobile engine. According to Keel, 1 kg. of acetylene gave as much energy as 2 kg. or 2.5 kg. of benzol, though the heats of combustion are only as 1.2:1. The reason for this Haber found to be that there is always an excess of air in the benzol fuel mixture, while acetylene can be burned with its theoretical air allowance. When the motor was run with benzol by expert chauffeurs on level ground, the exhaust contained 6 per cent or 7 per cent of CO_2, and 14 per cent of CO; while running up hill at a slower speed the exhaust contained 7 per cent to 8 per cent of CO_2, 8 per cent or 9 per cent of CO, and further, 2 per cent of hydrogen. The combustion of benzol was thus incomplete; in tests that of acetylene proved to be complete. In the experiments of Keel, which favored acetylene, the motor had been run for maximum power, but not for best fuel efficiency.

As regards the variation of the acetylene percentage in the air mixture, Keel stated that owing to the high pressures and temperatures produced in the cylinder, the admissible limits ranged from 1.5 per cent to 7.5 per cent of acetylene; Haber sets these limits at 3 per cent and 5 per cent. With mixtures too poor in acetylene, there was noisy back-firing; with rich mixtures, pinking. The pinking is generally ascribed to spontaneous pre-ignition of the mixture by the compression. Haber investigated this by driving his stationary internal-combustion motor by the dynamo (acting then as electric motor) so that the stationary motor itself served as a gas pump, the Bosch magneto being cut out. These and other experiments showed that pre-ignition was not due to the compression, but to the overheating of the gas mixture by the insulation of the plug electrode; the insulating material cools less rapidly than the metal parts, and when the insulation projected into the ignition zone, pre-ignition was observed to take place earlier, according to the richness of gas in the acetylene.

When rich acetylene mixtures are to be used, the cooling water should be kept especially cold or water should be injected into the cylinder. The injected water then cools directly, and also indirectly by diluting the acetylene; such a colder mixture is less liable to pre-ignition. It is difficult, however, to get the maximum power with pure benzol, because a third of the air, not really required for the combustion, is dragged as ballast through the engine, and the admixture of some other fuel is hence advisable.

In the tests use was made of the Kerschbaum throttle-mixer, a device which permits of controlling the amount of fuel mixture entering the cylinder without varying the proportions of the mixture. After this throttle mixer was fitted to the Fiat 20 hp. engine, it ran well on acetylene fuel, which it did not under the previous method of control, consisting in throttling the acetylene only.

ACCORDING to the report of a French investigating committee, the United States is rated as having 30,000,000 horsepower in water power, Canada 25,000,000, Norway 7,500,000, Sweden 6,750,000, Austro-Hungary district 6,450,000, Italy and Spain about 5,500,000 each. Germany's water power is estimated at only 1,500,000 horsepower, and that of England is about 1,000,000 horsepower, but it is pointed out that these two countries are richly compensated in coal.

Cheerful View of Gasoline Situation at Petroleum Institute

First national meeting of American oil interests is dominated by effort of producers to obtain from Congress equal rights with competitors of other nations to explore world's fields. Practical men assert there is a plentiful supply to meet future needs. Demand will stimulate production.

By James C. Dalton*

WHILE many side issues were involved in the discussions at the first annual convention of the American Petroleum Institute at Washington last week, the meeting was dominated by one big theme.

That theme, the one most dwelt upon by the big men of the industry, independents and others, was the determination to obtain equal rights with the nationals of other nations in the development of the unexplored oil fields of the world. There was evident a determination to obtain the backing of the American Government in this effort.

The natural assumption was that the program outlined was preliminary to an attempt to obtain from the incoming administration backing for American oil producers in an attempt to extend their operations to the far corners of the globe, and to have this stand reinforced, if necessary, by legislative action. Division of the oil fields of Mesopotamia, Turkey and the Near East among Great Britain, France and Italy was denounced in no unmeasured terms. Speakers whose names are found in the "Who's Who" of the oil industry called for a universal "open door."

Next in importance to this declaration of principles was the demand for the removal from the oil industry of government regulations which are regarded as hampering and the assertion that individuals should be permitted to develop natural resources along lines which promise greatest returns. There were warnings that the need for economy in the future will best be served by combinations of capital rather than by unrestrained competition and that enormous sums will be required for the exploitation of unexplored fields.

Another striking development was that some of the more practical men of the industry are not so much concerned over a future petroleum famine as the experts of the Geological Survey and the Bureau of Mines who have computed the probable reserves under the surface in this country and the other oil fields of the world.

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HERE is a partial "Who's Who" of the oil producers and oil experts who demanded, at the first annual convention of the American Petroleum Institute, that the Government of the United States back the efforts of its nationals in the exploitation of foreign oil fields by insisting upon an "open door" policy all over the world which would give them the trade rights now enjoyed in this country by the citizens of other lands:

W. C. Teagle, president of the Standard Oil Co. of New Jersey.

George Otis Smith, director of the United States Geological Survey.

Frederic R. Kellogg, general counsel of the Pan-American Petroleum & Transport Co.

R. D. Benson, president of the Tidewater Oil Co.

Thomas A. O'Donnell, chairman of the board of the California Petroleum Corp.

Henry L. Doherty, president of Henry L. Doherty & Co.

M. L. Requa, vice-president Sinclair Consolidated Oil Corp.

The international thread ran through the sessions from beginning to end. It inevitably brought to mind the fact that the Phelan bill providing for the incorporation of the United States Oil Corp. to develop the oil resources of foreign countries was referred to the Committee on Public Lands at the last session and undoubtedly will be brought up by the Senator from California when Congress reconvenes next month. Under the provisions of this bill the corporation would be controlled by a board of nine directors to be appointed by the President of the United States. The directors would be appointed with "due regard for their fitness and efficiency" and would represent the geographical divisions of the United States.

The bill specifies that "the corporation may explore, develop, refine, transport and store petroleum and its products, subject to a preferential right on the part of the United States Government to take all of its supply, or a portion thereof, at any time upon payment of the market price."

The measure would empower the corporation to establish subsidiaries in any state or territory and provides that "it may solicit subscriptions of stock, and the total capital shall be determined by the board of directors." It is stipulated, however, that it shall not enter into agreements which would cause an unlawful restraint of trade.

It was perhaps significant in connection with this bill that Henry L. Doherty, one of the largest of the independents, declared that the future capital requirements of the petroleum industry were so huge that monopoly would be impossible. He placed special emphasis upon this point after outlining his views upon evils of government regulation and interference with business. He was joined by Thomas A. O'Donnell, chairman of the board of the California Petroleum Corp. and president of the Petroleum Institute, in an attack upon what both characterized as government interference with business.

So far as the automotive industry was concerned, its

interest in the proceedings centered largely around the apparent disagreement among the oil men themselves as to the probability of an oil famine in future. The gloomiest predictions in this direction were made by George Otis Smith, director of the United States Geological Survey, in a paper on "A World View of the Oil Supply." He backed up his position by a recital of impressive statistics which showed that the present and probable future consumption in excess of current production was little short of alarming. He qualified the figures, however, by the statement that it was impossible to determine accurately just how much oil there is under the surface of the earth.

Smith's views were not shared either by Doherty, O'Donnell or R. D. Benson, president of the Tidewater Oil Co. Doherty said he had told representatives of the automotive industry that present users of motor vehicles, their children and their children's children never would have to worry about where the next day's supply of gasoline was coming from. He was confident, he said, that new and unexpected fields would be found in all parts of the world, and he also pointed to the enormous shale supplies. He declared that substitutes for petroleum cannot be produced economically.

Doherty placed motor vehicles at the head of a priority list for which fuel must be found. Next in order came motor boats, airships, lubricants and paraffines. He paid tribute to the part played by motor vehicles in winning the war, and declared that the cause of the Allies would have been lost but for their help because of government regulation of railroads. He added that the development of the internal combustion engine had opened to agriculture vast territories for the production of food.

A firm stand was taken by Doherty for the right of Americans to enter into competition with the producers of other nations in all the fields of the world. He asserted that the Standard Oil Co. had been "hamstrung" by a court decision while foreign monopolies had been left free to go their own sweet way. He warned the producers of the country that they must try to keep from being "hamstrung" while trying to make the government see the importance of taking a hand in the world development of oil.

In his address O'Donnell scouted the probability of an oil shortage, denounced government regulation and called for government co-operation with its citizens in oil developments abroad.

"The public has been frequently alarmed," he said, "by statements of well-meaning and learned scientists predicting an early exhaustion of our petroloum resources, in some instances giving more or less definite figures as to the supply still obtainable and setting a time for exhaustion within the limits of the lifetime of men now engaged in the business. There are many important petroleum deposits even within the boundaries of the United States that these men have not yet located or taken into their calculations.

"Petroleum is widely distributed throughout the world and, I believe, in sufficient quantities to meet the requirements, present and future, and if the economic law of supply and demand is given a free opportunity to assert itself, and artificial, political and governmental restrictions are removed, allowing everybody from everywhere to participate in the prospecting and production necessary, there will be plenty of oil to meet the requirements in all parts of the world for many generations to come. An assurance, however, of stable property rights and private ownership is necessary to encourage the prospector, with his vision of wealth, to get busy.

"During the history of petroleum in America there have been many ups and downs as to supply and demand. In each period of increased consumption and shortage of production there have always been frequent and loud predictions that the source of supply was exhausted and there never again would be sufficient oil to supply the demand. In every instance these predictions have been wrong.

"Increased prices have always resulted in increased activity of the wildcatter, which in turn has resulted not only in producing sufficient oil to meet the demands but in bringing about an over-production. There is nothing produced by man anywhere so responsive to the economic laws of supply and demand as petroleum. . . .

"Agitation by government officials, statesmen or politicians is just as dangerous as governmental regulation and interference. It destroys stability, credit and confidence as to the future. There is nothing we produce that needs the incentive of visions of wealth and the stability of property rights to a greater extent than petroleum.

"The danger now confronting us, which is really serious, is not caused by exhaustion, but is likely to occur through the foolishness of men in permitting restrictions caused by too much government. In addition to our known petroleum deposits and the new discoveries that are sure to occur we have enormous shale deposits in the western part of the United States as a reserve in case of need, but a proper active development throughout the world will produce our petroleum requirements so much cheaper than is possible to operate the shale beds, that I do not anticipate any important development in the shale during this generation.

"In the national interests, in the interests of the petroleum industry in this country, and in the interest of the people of the world, we ask our own Government for no special privileges anywhere, but we do ask for a friendly co-operative spirit by our Government in the interest of American citizens and American capital engaged in the development of the petroleum industry abroad.

"We ask for no financial assistance by our Government except to use all proper means to stabilize and protect property rights where honestly acquired. The petroleum industry of this country has the necessary talent, energy, resources, and will to take an active part in the development of this very essential product, which would be in the interest of all people everywhere."

Benson of the Tidewater was optimistic as to the future. In closing his review of the situation he said:

"I believe that production in the United States will be entirely governed by the price paid for crude oil, for a longer period than anyone, no matter how learned, can safely predict; and I will close as I began, by voicing my father's belief that Kind Providence never limits the supply of anything so valuable as petroleum. To this I add only that price will bring production, and that territory still unknown will be found to meet the needs of future generations as they arise."

Director Smith of the Geological Survey joined with the oil men in stressing the importance of seeking new fields.

"There is urgent need," he said, "for pioneering the world for oil to meet the needs of this generation, but there is no warrant for regarding this advance into new fields as beginning a contest whose aim is world conquest. The present need of the United States for oil from abroad can be met only by world-wide exploration, development and operation by American companies backed up by our Government; and we should expect other nations that are embarrassed by a similar or even greater discrepancy be-

tween consumption and production to adopt the same policy.

"The first thought in either a national or a world program for oil is to stimulate production. 'More oil needed' describes the symptom felt by every nation, and new and larger supplies of oil is the remedy sought.

"Plainly, the common interest in a limited resource is not served simply by regulation of price. It is of greater consequence to the public, either the people of a single nation or humanity as a whole, that the best use rather than the freest use be made of an invaluable resource. **The danger that lies in cheapness is the wastefulness of to-day that will lead to the consequent scarcity and corresponding high prices of to-morrow.**

"The oil problem can be solved only through a keener realization of the world's future needs and a stronger determination to serve future interests. Any taking over of the rules of war into the economic competition for new supplies of oil or for markets for oil products will waste a limited resource as well as threaten world peace."

Smith emphasized the menace of depleted oil supplies for the future and pointed out that development of shale reserves would mean higher prices. He advocated the open door policy which "need not involve throwing away the key," and said much could be gained for all nations by pooling the world's petroleum resources. He asserted that the coal resources of the country were adequate to meet all its power needs for 57,000 years, but that if oil were used for the same purpose the visible supply would last only 9½ years.

The greater production of gasoline, he said, had been at the expense of lubricating oil, which he held was the more important of the two. In pointing out the importance of lubricants he declared that even government regulation should be provided to enforce the greatest good to the greatest number. The use of gasoline in "pleasure" automobiles, he asserted, finds no economic justification. Trucks and tractors must be given first place in the line at fuel stations, he said, adding that the country must make the best use of its fuel resources.

In this connection he urged more widespread use of water power to generate electricity, and pointed out that it could do much of the work now being done by oil. **"The world has not enough oil," he said, "to burn under either stationary or locomotive boilers."** Economy must be exercised and wastes of fuel avoided through the elimination of much of the small competition which now prevails in various branches of the oil industry, Smith contended. He added that the price of coal has increased out of all proportion to the price of oil.

The growing importance of oil in international relations was stressed in the address of W. C. Teagle, president of the Standard Oil Co. of New Jersey. In effect he served notice upon the world that if other nations persisted in giving oil monopolies to their nationals in the unexploited fields of the world the United States would be compelled in self-defense to adopt retaliatory measures.

If other nations persist in this attitude, he declared, while relying upon the United States for a large share of their present day needs, then, and in that event, this nation will have no alternative but to take cognizance of the attitude of foreign governments, and as a matter of necessary self-protection to consider the adoption of measures reciprocally to conserve its petroleum resources for its own people.

"YOU are all generally familiar with the terms of the San Remo agreement, proposing a division of Mesopotamian and other Near East territory between the British and French, and the tripartite agreement recently entered into by Great Britain, France and Italy defining the spheres of influence in Turkey which is susceptible of diplomatic inquiry as to its true meaning.

"You know that Persia is almost entirely limited to the development work of one English company, that a Dutch company enjoys almost a complete monopoly in the Dutch East Indies; that Japan restricts development of petroleum properties to her citizens. The French provided by the act of Sept. 9, 1919, for complete nationalization of all mineral resources.

"If foreign governments insist on pursuing the policy of nationalizing oil lands, and reserving sub-soil rights to be held under government direction; if they persist in attempting to keep all of their own petroleum deposits for their own future benefit, while relying upon the United States for a large share of their present-day needs, then, and in that event, this nation will have no alternative but to take cognizance of the attitude of foreign governments, and, as a matter of necessary self-protection, to consider the adoption of measures reciprocally to conserve its petroleum resources for its own people."—W. C. Teagle, President of Standard Oil Co. of New Jersey.

"The United States has no desire to interfere with the political relations of any power with a colony, with a protectorate or a mandated area, but when it is proposed to use these relations to create exclusive economic spheres within which the development of natural resources is to be confined to the parent or dominant country and to extend and buttress these exclusive alliances, we are justified in raising our voices in protest against establishment of a system which we believe to be unjust, injurious and unwise.

"With its position in world trade and the economic and financial weapons ready to hand, the United States could undoubtedly compel a new allotment of foreign oil territory so as to give it a share of what other nations are now proposing to keep for themselves. But we do not propose this. Might never makes right, and the smaller countries without similar means of forcing their way into such a division deserve better treatment at our hands."

Preliminary to this declaration of principles, Teagle referred to the terms of the San Remo agreement, proposing a division of Mesopotamian and other Near East territory between the British and French and the tripartite agreement recently entered into by Great Britain, France and Italy defining the spheres of influence in Turkey, which is "susceptible of diplomatic inquiry as to its true meaning."

Teagle pointed out that the United States is spending its petroleum wealth for the world's benefit in order to meet 70 per cent of the world's present demand, and added:

"Domestic crude is not sufficient even for current home demands and it is absolutely imperative that American petroleum producers proceed actively and intelligently to develop oil resources in foreign lands. They are particularly fitted by past experience and training for this work."

A statement designed to reassure American producers as to the aims of Great Britain in exploiting the world's oil fields was made by Richard Airey, vice-president of the Roxana Petroleum Co. Motives which have been as-

cribed to Great Britain of seeking to create a monopoly over the potential oil lands of the world are untenable, he said. The United States enjoys the balance of power in petroleum in her own possessions, and in addition controls by far the greatest share of the production in Mexico. Her holdings in Central and South America are greatly in excess of the aggregate held by all other countries.

"So strongly entrenched is the United States in the great world reservoir of oil," he declared, "that it would be well nigh impossible to take the lead away from her, even assuming that there was the slightest evidence of a desire to do so. It requires the highest qualities of statesmanship and commercial enterprise to bring about a more normal state of affairs, and it seems to me that the entrance of the nations of Europe into the petroleum fields will go a long way to bring about the early return of normal business conditions."

Frederic R. Kellogg, general counsel for the Pan-American Petroleum & Transport Co., controlled by Edward L. Doheny, denounced bitterly the confiscation of oil lands in Mexico, and called upon the Government for the protection of American interests there. His statements in this respect resulted in a request from R. V. Pesquiera, special representative of Mexico in this country, for a hearing, and it was given at the closing session of the convention.

Conservation was considered by M. L. Requa of the Sinclair Consolidated Oil Corporation, another recruit taken by the industry from the Bureau of Mines. He declared that the consumption of fuel oil, natural gas and gasoline is inexcusably wasteful and advocated centralization of conservation efforts in the hands of the Petroleum Institute. He said that from 10,000,000 to 15,000,000 barrels of gasoline are lost in this country each year through inefficient handling and storage and that at least half this could be saved. He also pointed to waste at refineries and to the losses from pipe lines, which are very heavy. He decried secrecy about refining processes, which really are known to all, and in this respect echoed George Otis Smith, who intimated that the Government has the power to throw open to everyone use of the Burton process for cracking. Referring to the automotive industry, he said:

"The requirements of automotive transportation, particularly truck and tractor, are growing so rapidly that a supply of motor fuel can only be assured for future years by giving the utmost attention not alone to economy of operation, but also to the more difficult problem of adapting the engine so as to permit the maximum increase in the fuel supply. **The problem of co-ordinating engine and fuel is thought by many engineers to represent one of the most important issues now occupying the field of automotive transportation. Is the co-operation between the automotive industry and the petroleum industry in the solution of this problem effective; is it serious, and can it be made still more satisfactory?"**

Requa said he had a horror of governmental control or supervision save in the broadest terms, but he warned the oil men they must expect such control if they lacked efficiency in self-government.

The case of the automotive industry was presented at a general session by C. F. Kettering of the General Motors Corp. as the mouthpiece of the Society of Automotive Engineers and the National Automobile Chamber of Commerce. H. L. Horning was chairman of the section which considered efficient utilization of fuel oil, motor fuel, lubricants, etc.

In view of the predominant part played by international oil relations at the convention, it was considered significant that Norman H. Davis, Under-Secretary of State, reconsidered his acceptance of an invitation to speak at the annual dinner of the institute. He announced at the eleventh hour that pressure of official business made it impossible for him to be present. "Petroleum as an International Problem" was the subject which had been assigned to him.

Automotive Vehicles and Factories Foremost in Safety Work

(*Continued from page* 1070)

ever, do not alone awaken in the heart and mind that spirit that is really needed not only on the part of the employer, but on the part of the employee as well, if safety work is to attain the full measure of success.

"There have been some employees who have not achieved great success in safety work because even though they pretend to inaugurate safety work, they were not safety men at heart. Experience has proved that success in this work springs from the heart and a determination to concentrate every resource necessary upon the obtaining of results.

"A life saved is a life saved, whether it be in spectacular fashion with the world applauding the hero, or whether, by the application of approved safety devices, a worker is kept from being ground up in the gears of a machine."

According to C. M. Talbert, Director of the Department of Streets, St. Louis, the automobile is rapidly forcing the growth of the council, which is as yet in its infancy.

The next annual meeting will be held at such a time and place as the board of directors designate, but the opinion seemed to prevail that the East would claim the next convention. Boston and Pittsburgh were mentioned and Buffalo boosters advanced strong arguments.

New Type of Trailer for South Africa

A new type of trailer manufactured by the South African General Electric Co. (branch of the General Electric Co., New York) for the S. A. Railways. The truck used for testing was an F. W. D. These trailers are being made in South Africa

Organized Research Into Highway Transportation Problems

The automotive industry is much interested in this development of the work by the National Research Council, which is to study the design, materials, machinery, financing and use of the proposed national highways of this country. Government Bureaus already co-operating.

By Clyde Jennings

AN organization that, it is hoped, will bring intelligence and system into the highway building efforts was formed when the Advisory Board on Highway Research of the National Research Council resulted from a meeting held in the Engineering Societies Building in New York recently.

There were present at this meeting representatives of the American Association of State Highway Officials, Emergency Division of the Committee on Economic Theory of Highway Improvement, Society of Automotive Engineers, Bureau of Public Roads, Emergency Division of Committee on Structural Design of Roads, National Automobile Chamber of Commerce, Division of Geology and Geography of the National Research Council, American Institute of Consulting Engineers, Western Society of Engineers, American Automobile Association and a number of university faculty members.

Prof. C. A. Adams, chairman of the Division of Engineering, National Research Council, called the meeting to order and briefly stated the object. Dean Anson Marston of the Engineering Department of Iowa State College, named as chairman of the day's session, made an impressive statement of the general problem awaiting solution.

He said that the person approaching the highway problem must not think in terms of good roads, but must think of billions of dollars, billions of miles of vehicle travel, making this into a problem that directly affected the everyday life of every person in the country. He said also that lack of knowledge of the expenditure of this money is very costly, and that there is a need for many research committees because there are many things to be studied. Further, there is no accepted type of road structure and cannot be any type that will be acceptable for conditions that are confronted in all sections of this country of varied climate and soils. One present Iowa problem is the removal of a hill. It is known that the work might cost $160,000 but whether the benefits to be gained will justify that expenditure are not known.

The vision of a Jules Verne is needed for the engineer who will look into the future of transportation. Then, as if in contrast, the man who does the other research must get down to the practical, instead of the theory. He expressed the hope that when this work is organized, the chairmen of the several committees will be workers, men paid to answer the questions presented to them and to give the proper attention to a co-ordination of the efforts of the workers under them.

Thomas H. MacDonald of the Bureau of Roads, mentioned the immense sums of money that are being put into road construction, and expressed the wish that all of those concerned with the problem would forget the "good roads" designation of the subject and consider it as a transportation problem. There are now, he said, three automotive vehicles on every mile of road in this country, and there would be an increasing number. These vehicles, he said, were vital to the people of the country.

Roy Chapin of the N. A. C. C. presented a practical side that had been mentioned by Dean Marston. The need of a research into the methods of financing roads, so that the road would not be entirely destroyed before the bonds were retired. He met the challenge of a question by assuring those present that the automotive manufacturers and engineers were always ready to redesign their vehicles to meet conditions, and that the manufacturers were as anxious as any other persons to have an economical car for proper highways.

Professor Aff of the Iowa State College, and A. T. Goldbeck of the Bureau of Roads, described briefly the research already undertaken, and promised results in the near future. A member of each organization represented was called upon and all were agreed as to the bigness of the problem.

The by-laws adopted set forth the following objects of the Board:

a To assist in outlining a comprehensive national program of the highway research and coordinating activities thereunder;

b To organize committees for specific problems;

c To deal with ways and means;

d To act in a general advisory character.

There was some discussion as to the membership of the Executive Committee. It was the opinion of most of those present that the Executive Committee should be selected from the Advisory Committee, which will be composed of representatives of the member associations. But it was explained that all work done under the National Research Council, because of the nature of the Federal Executive Order, must be done under the direction of the Division of Engineering of the Council. So it was decided to have the executive committee consist of three members of the Engineering Division. There will be a director, an engineer, who will devote his entire time to the research work and who will direct the various committees. The committees provided for in the by-laws are:

a Bibliography,

b Economic Theory of Highway Improvement,

c Structural Design of Roads,

d Character and Use of Road Materials.

The financing of this venture into research is placed in the hands of a Ways and Means Committee.

French Cars Make Excellent Showing in Fuel Competition

There has been considerable discussion in this country of a possible official fuel competition. The French industry has held such a competition under closely controlled rules. The results, as interpreted in this article, are worthy of careful consideration by American manufacturers.

By W. F. Bradley

AVERAGING 28.3 miles to the American gallon, a Voisin sedan with sleeve valve 3.7 by 5.5 in. four-cylinder engine with a total weight of 5324 lb., won the French fuel economy competition and established a world's record for this class of performance.

The competition was run on a closed circuit near Le Mans, guarded by troops and having official controllers at distances of not less than one hundred yards. The amount of fuel to be allowed to each competitor was calculated in advance and was based on piston displacement, weight and nature of the body. Under this arrangement all the cars were started practically at the same time, and the one covering the greatest distance was the winner. The four-cylinder Voisin sedan, driven by Cabaillot, ran out of fuel after covering 136 miles. Second prize under this rule fell to an entirely different kind of vehicle, a Chenard-Walcker pneumatic-tired tractor hauling a four-wheel pneumatic tired trailer loaded with bottles of beer. This combination covered 124 miles on 16 gallons of fuel, or at the rate of 7.7 m.p.g. The Chenard-Walcker has a four-cylinder 3.1 by 5.5 in. engine, and the total weight of the combination was 19,550 lb.

Kind of Fuel Optional

A standard four-passenger Citroen, as delivered to clients, but with special carbureter tuning, got third place with 50.9 m.p.g. The highest mileage per gallon recorded by any of the eighty odd competitors was 76.1 for a four-cylinder two-seater Peugeot Quadrilette driven by a French technical journalist under the nom de plume of Paul Chap. This type of machine was brought out by Peugeot about a year ago, and had tandem seating. Chap had a special body built with side-by-side staggered seats. A large number of Citroens averaged better than forty miles to the gallon.

Under the rules competitors could use any kind of fuel they liked, but the allotment was made on bulk, and not on weight. The majority preferred benzol to gasoline. Two grades of gasoline are available in France, heavy and light; only a few preferred the former to the latter. One machine ran on pure kerosene. This was a Unic four-cylinder five-passenger weighing 4386 lb., which was given 3.7 gal. of kerosene, on which it covered 66 miles, or at the rate of 17.9 m.p.g. The Unic engine has 4 by 5.9 in. cylinders and employs the Bellem system of direct injection of kerosene into the combustion chamber.

A Fiat 1½-ton truck on pneumatic tires used 60 per cent benzol and 40 per cent kerosene, with the Payenchet carbureter, and averaged 11.6 m.p.g., with a total weight of 7197 lb. The truck had been bought from the French army stores. Another Fiat, with a four-cylinder 3.1 by 5.5 in. engine, hauled a light trailer, making its total weight 5346 lb., and averaged 19 m.p.g.

Americans Made Poor Showing

America was represented in the competition by a Scripps-Booth, several Fords and one Cadillac. Although fitted with European carbureters, the Scripps-Booth having a Claudel and the Cadillac a Standard, these two were last in their respective classes, the former averaging 24.7 m.p.g. and the latter 12.9. The best Ford performance was put up by Leroy with 22.7 m.p.g., using the Ford carbureter with modifications. Delbecker, a Claudel expert, had a higher average, with 26.1, but went a shorter distance. He worked under a handicap, for he had adjusted his carbureter for benzol and was given gasoline instead.

Owing to the present high cost of fuel in France, where a gallon of gasoline averages $2.10, the greatest interest was attached to these trials. Practically all the cars were entered by manufacturers, by carbureter makers, or by dealers interested in some particular carbureter. Elaborate precautions were taken to prevent dodging the rules. Special gravity tanks had to be fitted for the competition, and the ordinary tanks had to be emptied. Electric starters were all disconnected before the competition began. The course measuring only about eleven miles round, it was possible to guard it very efficiently, and both troops and observers were placed around at close intervals. The entire course was marked off at intervals of 100 yards, and each observer given a hundred yards section to control. When a machine came to a stop with its tank empty, it was a simple matter to check up its distance between the hundred-yard posts.

Engines Warmed Up in Advance

It was permissible under the rules to warm up the engine before starting, and everybody took advantage of this to the full. About ten minutes before the start the main tanks had to be emptied, and this meant stopping the engine, but precautions were taken to conserve the heat thus obtained during the preliminary running. Some of the drivers ran their water to boiling point in order to have a correct temperature after the engine had cooled off a little while waiting for the actual start. All realized the necessity of running at a fairly high temperature, and radiator muffs or screens and radiator thermometers were commonly employed.

The Voisin team made the most careful preparations for the competition. In view of this test the compression of the two engines was increased to 113 lb. Both the sedan and the open touring car had bodies specially designed by

Gabriel Voisin to reduce air resistance to the lowest possible figure. The competition gasoline tanks were shaped like a torpedo and mounted on the top of the hood, the outlet being at the front end, direct to the carbureter by gravity. Both men drove for economy, and on the hairpin turn, where the road had been plowed up, they stalled on a couple of occasions. In order to show that he had power in reserve when required, Artault ran his last lap at 60 miles an hour.

Kinks on Improving Economy

There were several cases of hot water injection. On one of the cars a lead was taken from the top of the radiator and another from the top of the dashboard gasoline tank, and the two brought into the inlet manifold, with the idea of getting a steam and gasoline vapor into the cylinders.

The six-cylinder Excelsior, which had two Claudel carbureters, had the intake pipes wrapped with coils of copper pipes circulating water. In addition there was a lead from the radiator overflow to the mouth of the carbureter, so that the engine was always aspiring steam or hot air. On one of the Majola cars an attempt was made to recuperate heat units from the exhaust. A pipe connected to the exhaust was brought up to a filter on the forward face of the dash, and the gases then led into the intake manifold. It was claimed that a certain number of heat units were put back into the cylinders.

Competition by Formula

It being the first time a fuel economy competition had been held in France, the formula under which fuel was allotted was more or less an experiment, and this was admitted by its author, Charles Faroux. It proved to be very successful. Two other formulas were therefore adopted in addition. In order to take speed into consideration, the formula

$$R = \frac{PV}{C}$$

in which P equalled total weight, V speed and C consumption, was used, with the following result:

1. Voisin, Artault.....1527 points
2. Voisin, Cabaillot .....1248 points
3. Rolland-Pilain, Pilain.....1035 points
4. Citroen, Barbier .....

Another classification was made on the basis of fuel cost per passenger per hundred kilometers (62 miles), gasoline being taken at the average price around Paris. The results, reduced to cents per mile per passenger, were as follows:

	Cents
1. Citroen, Barbier	0.757
2. Voisin, Cabaillot	0.800
3. Citroen, Penaud	0.874
4. Buchet, Brouin	0.884
5. De Dion, Bocchi	0.957
6. Citroen, Chateau	0.978
7. Sigma, Pelissier	0.990
8. Peugeot, Chap	1.055
9. Sizaire-Naudin, Carteau	1.072
10. Sigma, Raguenet	1.115

Under this formula the competitors using benzol had some advantage for the cost of this is $1.60 per gallon, compared with $1.90 per gallon for gasoline. These are prices just outside Paris, where cost is lowest.

FRENCH FUEL CONSUMPTION TRIALS

TEN BEST PERFORMANCES, IRRESPECTIVE OF CLASS

	Weight, Lb.	Fuel, Gal.	Miles C'v'd	Miles Per Gal.	Ton Miles Per Gal.
1. Voisin, Cabaillot	5324	4.8	136	28.3	75.4
2. Chenard-Walcker, Lagache (Trailer) ..	19,550	16	124	7.7	75.2
3. Citroen, Barbier	2568	2.2	112	50.9	65.3
4. Peugeot, P. Chap....	1201	1.3	99	76.1	45.7
5. Sizaire-Naudin, Carteau	4122	3.3	96	29	59.8
6. Citroen, Repusseau ..	2579	2.2	96	43.1	55.5
7. Voisin, Artault	3968	3.1	94	30.3	60.0
8. Mathis, Flambard ...	2204	1.9	93	48.9	53.9
9. Citroen, Chateau	2590	2.2	90	40.9	53.0
10. Mathis, Lahm	1984	1.6	89	55.6	55.1

Motor Cars in Portuguese Africa

STEADY increases are being recorded in the motor population of Portuguese East Africa, although the use of these vehicles is confined principally to the city of Lourenco Marques. An estimate that about 200 passenger cars and 20 trucks are owned in that city is made in a letter just received by AUTOMOTIVE INDUSTRIES from John A. Ray, the American Consul there.

Portuguese East Africa, according to the Consul, now has a white population of about 10,000, half of whom live in the capital city. The climate varies from tropical in the north to subtropical in the Lourenco Marques district, and although some tin and copper are mined near Beira, the chief business of the province is tropical agriculture. Outside of sugar, the only manufactures of importance are of soap and cigarettes. The province exports sugar, copra, oil seeds, cotton, sisal, maise, beeswax, wild rubber, mangrove bark and hardwoods. In addition, there is a large export of Transvaal coal through Lourenco Marques and of Rhodesian chrome and copper ores through Beira.

Consul Ray adds that some confusion results from a misunderstanding of names of the province and its capital. Portuguese East Africa, he explains, is frequently called Mozambique, as the official designation of the entire territory is the Province of Mozambique. However, the city of Mozambique is the capital of Mozambique only, the capital of the province being Lourenco Marques. Further confusion is added by the fact that there is a chartered company known as the Company of Mozambique, which administers the territory surrounding Beira.

The province has a total area of 293,884 square miles and a coast line of 1380 miles, which possesses several excellent harbors, the most important being Lourenco Marques, Inhambano, Beira, Chinde, Quelimane, Mozambique, Porto Amelia and Ibo. The capital and Beira have railway connections with the South African system.

In discussing trade and business generally, Consul Ray says:

"There is steamer connection with the United States and the rest of the world. The general customs policy is liberal and the terms of credit are similar to those usual in South Africa. Commercial ratings are obtainable through regular agencies or through the Lourenco Marques banks, the Banco Nacional Ultramarino, Banco Colonial Portugues, Standar Bank of South Africa, the National Bank of South Africa and its branches, and the Banco de Beira. Although the official language is Portuguese, English is generally understood in commercial circles."

Truck Weights and Road Wear

Editor AUTOMOTIVE INDUSTRIES:

The editorial in your issue of Oct. 21, entitled "Road Wear and Types of Final Drives," discusses a subject of the gravest importance. This subject probably will have a direct influence upon the future of road and vehicle design, construction, maintenance and administration.

We know that static load imposes no serious stresses in the road slab.

We know that the slab is seriously stressed by impact shocks.

We know that impact shocks increase in proportion to the vehicle speed raised to approximately the one and seven-tenths power and also in direct proportion to the unsprung vehicle weight.

We know that vehicles equipped with pneumatic tires impose practically no impact on the road slab.

For the consideration of a committee formed to appear before the special commission appointed in New Jersey to investigate such matters I proposed the following schedule for license fees:

Horsepower

Pneumatic tires	$0.25 per hp.
Solid rubber tires	.25 per hp.
Metal or other hard tires	.25 per hp.

Unsprung Weight

Unsprung weight includes the weight of axles, wheels, tires, steering arms, tie rod, and also one-half the weight of drag link, springs, radius rod, torque arms and drive shafts, if vehicle is shaft driven. This data to be furnished to Secretaries of State and Motor Vehicle Commissioners by the National Automobile Chamber of Commerce and to be stamped on caution plate of new vehicles by manufacturer.

Pneumatic tires	$1.00 per 100 lb.
Solid rubber tires	2.00 per 100 lb.
Metal or other hard tires	3.00 per 100 lb.

Sprung Weight

To be obtained by subtracting the unsprung weight from the allowable gross weight which is now stamped on caution plate by the manufacturer. Allowable sprung weight to be stamped by manufacturer on caution plate of new vehicles.

Pneumatic tires	$0.05 per 100 lb.
Solid rubber tires	.10 per 100 lb.
Metal or other hard tires	.15 per 100 lb.

Weight Restrictions

Maximum allowable gross weight on any wheel 11,200 lb., distributed not more than 800 lb. per inch of tire width, said width in the case of rubber tires to be measured between the flanges of the rim.

Maximum allowable unsprung weight on any wheel 1960 lb., to be distributed not more than 140 lb. per inch of tire width, said width in the case of rubber tires to be measured between the flanges of the rim.

Minimum allowable distance between axles, 4 ft.

Solid rubber tires must be replaced when worn to within one inch from the rim.

On homemade or orphan vehicles previously licensed where it is impossible to calculate the actual unsprung weight the following procedure can be followed:

Place a weighing jack under each wheel in turn. When a wheel has been jacked clear of the road, read and record the gross weight on that wheel. With the gross wheel weight supported by the weighing jack place an ordinary jack with proper blocking under the frame as near the axle as possible. Raise the frame with this second jack until the bushings at either end of the vehicle spring indicate that they are floating on the spring shackle bolt, the weight indicated on the weighing jack will then be the unsprung weight on that particular wheel.

The difference between the gross wheel weight and the unsprung wheel weight of a vehicle loaded to capacity will give the sprung weight on which this portion of the license fee should be figured. If a vehicle is not loaded to capacity at the time it is weighed, the calculation of the license fee on unsprung weight should include a sufficient amount to bring the body weight allowance and pay load up to the manufacturer's rated capacity. The pay load capacity of a passenger vehicle shall be the sum of the adult seating capacity multiplied by 150 lb.

Everyone has agreed that users of the road should pay for road maintenance in proportion to the damage which they inflict on road surface. I believe that the suggested schedule of license fees will accomplish this result.

As an example of how this would work out with existing equipment, let us consider the license fee for a 2-ton shaft driven truck on pneumatic tires.

Horsepower—25.6 × $0.25	$6.28
Unsprung weight—20.75 cwt. × $1.00	20.75
Sprung weight—83.65 cwt. × $0.05	4.18
Total	$31.21

The present fee is $17.50.
The fee by bill No. 331 would be $60.00.

The same vehicle on solid rubber tires would pay:

Horsepower—25.6 × $0.25	$6.28
Unsprung weight—20.75 cwt. × $2.00	41.50
Sprung weight—83.65 cwt. × $0.10	8.36
Total	$56.14

The present fee is $29.00.
The fee by bill No. 331 would be $60.00.

Now let us consider the fee for a 5-ton shaft driven truck on solid tires:

Horsepower—40.0 × $0.25	$10.00
Unsprung weight—43.75 cwt. × $2.00	87.50
Sprung weight—179.25 cwt. × $0.10	17.90
Total	$115.40

Present fee $53.00.

The fee by bill No. 331 would be $210.00.

The same 5-ton vehicle with chain drive, or any drive which reduces the unsprung weight, on solid tires:

Horsepower—40.0 × $0.25.....	$10.00
Unsprung weight—37.75 cwt. × $2.00..	75.50
Sprung weight—179.25 cwt. × $0.10...	17.90
Total	$103.40

Present fee is $51.00.
Fee under bill No. 331 would be $195.00.

INTERNATIONAL MOTOR COMPANY,
D. C. FENNER, *Public Works Department Mgr.*

No Bench Tests with Next Year's Grand Prix

Editor AUTOMOTIVE INDUSTRIES:

I have read, with much interest, your article on Rules of the Grand Prix de France, published in your issue of Oct. 7.

We are entirely in accord regarding the fact that the preliminary bench test was a dangerous and difficult thing, which could have undoubtedly rendered the Grand Prix a failure.

Ralph de Palma, whom I saw yesterday, said the same thing and added that a similar requirement for next year will bring no American entries.

I am sorry that the Automobile Club of France should continue to ignore the A. A. A. as well as the great American automobile papers, since our club informed the A. C. A. about one month ago, that the regulations had been changed, and that for the 1921 Grand Prix, they are exactly the same as those of Indianapolis.

I must inform you of the foregoing, in the plainest possible terms, so that American manufacturers will know the truth and understand our spirit.

I wish to add that at the present moment it looks almost certain that the Grand Prix de France will be run at Strasbourg, at a place quite near to the region of the American battlefront, where Americans, of course, are particularly well-liked. The French desire is very keenly to see many entries of your country for next year's race, and I thank you in anticipation of your readers informing through your excellent revue, that there will be no preliminary bench test the coming year.

CHARLES FAROUX.

Revision of Contract Prices

Editor AUTOMOTIVE INDUSTRIES:

You are undoubtedly aware of the pressure which is being brought to bear on the independent steel sheet manufacturers by the automotive industry to either revise their prices downward or else accept cancellations. The steel people are now trying to make it appear as though the automobile manufacturers were welching on their contracts.

The independent sheet manufacturers belong to the National Association of Sheet & Tin Plate Manufacturers which adopted about four years ago a supposedly "irrevocable" contract form. The literature sent out at the time by the association bore the legend: "Sales contracts to be valid must obligate the buyer and seller."

In fact, the independent sheet manufacturers violated these contracts time and again during the flurry of last spring and summer when they failed to make deliveries in accordance with specifications furnished them by the automobile manufacturers. Under their contract form, they would have been obligated to pay to the buyer the difference between the contract price and the sky-high premiums then prevailing. I know of no instance where any automobile builder received such reimbursement from the sheet people in spite of the fact that many were compelled to go into the premium market and pay $85 for sheet bars and exorbitant prices for converting these bars into sheets.

It is only natural that the same people should now refuse to consider contracts which were so ruthlessly violated by the steel mills then, other than as "scraps of paper" now.

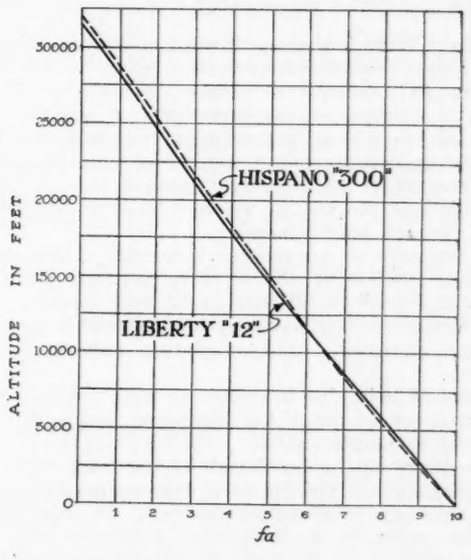
It has always been an unwritten law in the steel industry that contracts for semi-finished steel could be cancelled at buyer's pleasure, but that once he had furnished specifications, he was more or less obligated to take the finished steel. Even then, however, cancellations have been so frequent that they have almost become a custom of the trade. It is absurd for the independent sheet makers to assume the role of martyrs whom the automobile builders are trying to "do" by not taking from them sheets at twice their honest value.

WILLIAM CRAWFORD HIRSCH.

The Variation of Horsepower with Altitude

J. E. Schipper

IN a report signed by L. V. Kerber, of the Engineering Division, Air Service, McCook Field, Dayton, Ohio, the variation of horsepower with altitude is discussed. An empirical chart has been arranged by Mr. Kerber and is shown in Fig. 1. This curve applies to a propeller efficiency of 100 per cent at the ground. To find the horse-



power at any altitude of a propulsive system consisting of a given engine and propeller, multiply the factor at that altitude from Fig. 1 by the brake horsepower of the engine corresponding to the revolutions per minute expected at maximum ground speeds and by the efficiency of the propeller at that revolution per minute and speed; that is,

$$\text{HP.}_a = f_a \times \text{HP.}_g \times \text{efficiency}_p.$$

Curves for the Liberty 12 and the Hispano-Suiza 300 are given.

Industrial Autocracy Has a Danger All Its Own

Every one knows of the feudal system and its evils. Perhaps you thought that all of these evils were disposed of before America became a world power. Can political democracy and industrial autocracy operate together? This article indicates that some of these evils exist today.

By Harry Tipper

SOME years ago, when we were entering the war, in addressing a group of editors in regard to the relations between employers and employees, I asked this question in opening up the subject:

> **"We have found it impossible for one democratic nation to exist continually in peaceful contact with a neighboring autocratic nation. How long will we find it possible to run our own nation with a political democratic system and an industrial autocratic system?"**

The purpose of the address was to show the essentially autocratic character of the manufacturing system which had grown up through the introduction of machinery, and the use of new methods. Not long ago, Mr. Dickson, vice-president of the Midvale Steel and Ordnance Company, made an address before the American Society of Mechanical Engineers, in which he refers to this point and refers to it so clearly that I am quoting exactly from his speech.

> I believe there is a grave menace to our American ideals in the highly centralized, autocratic control which is becoming a marked tendency in our great industries. The feudal system was based on the ownership of land and its appurtenances—such as highways, mines, streams, fisheries, etc.—by the barons, and it was effective in securing automatic control of the workers, because the vast majority were tillers of the soil, or workers in other industries controlled through land ownership.
>
> The tendency of our modern industrial system is toward autocratic control of the workers through ownership of what our socialistic friends term "the tools of production," which include not only the natural resources, but also the furnaces, mills, factories and transportation systems.
>
> Instead of indulging in glittering generalities, let me cite two instances on what has happened under the existing system of corporate control.
>
> Some years ago, a gentleman at the head of one of our great corporations decided that prices must be maintained in the face of a diminishing demand. In order to accomplish his purposes he restricted production by shutting down a number of large plants located in different communities, each of which had been built up largely as an adjunct of the plant.
>
> Some of these plants were kept closed for about a year, and the result was disaster to the communities. The merchants were driven out of business, real estate values were depreciated, and the workers were thrown on their own resources and had to break up their homes and seek employment elsewhere. None of these persons had any voice in the momentous decision, which was made in a New York office and which resulted in social paralysis in all of these communities.
>
> This last summer the president of one of the largest textile companies suddenly announced that his mills would close for an indefinite period, and they were closed in the same arbitrary, autocratic manner as above described.

The facts which he has stated as indicating the autocracy which has developed in connection with the operations of the modern industrial system are only two samples out of innumerable instances which could be mentioned. The old feudalism was eliminated in the countries as they progressed, because the people refused to exist any longer under a system where all the materials of economic necessity were owned by the feudal land owners, and it is inevitable that the unrest among the workers will continue until they feel that they have some essential partnership in the economic tools and operations of to-day.

Not long ago a large manufacturing concern decided to give up its plant in a State located on the Atlantic seaboard and move about a couple of hundred of miles further inland. As Mr. Dickson said, of the cases he cited, in this instance the workers had nothing to say about the matter at all. The company decided for reasons of advantage to itself that it would move its whole equipment from the one point to the other. This move affected about 20,000 people, and they could either move with the plant or take their chances upon getting some other work. Some of these workers had lived in the town for years.

The employees of the concern were members of the council, they were interested in the churches, their children were going to high school and other schools. From the time that the decision was made, there was six months in which they could decide on their own movements. The town from which they were moving did not have more than 70,000 population and there were no other big manufacturing concerns. The town to which they were going had a population of about 150,000 inhabitants, and the concern that was moving its plant did not undertake to provide houses or schools or churches or the community spirit which they were leaving.

All men who have been engaged in manufacturing for a number of years can recite instances of a similar character.

Supposing the feudal landowner decided to move about, move his farms from one point of his land to another and to rearrange the work on his land. The people were obliged to accept his decision because they had no other choice. **We look back upon those days, call those people slaves and thank God we are living in another generation.**

The ownership of the building, machinery, processes, money and the other tools of production or distribution is so completely in the hands of the owners of industry and its disposition so definitely in the hands of the industry, that the worker has no voice either in the character of his

work or the decision in respect of his work, unless the organization of industry is rearranged sufficiently to provide for it.

It is encouraging to note a statement of this kind by the executive of a large industry, as indicating that some business men are beginning to recognize the autocratic character of the present industrial organization, no matter how benevolent that autocracy may be or how much it may desire to foster the well being of the workers from its own ideas and plans.

This is the background of the struggle in Great Britain and other European countries, for a complete change in the system of industrial and political development. In Great Britain particularly the autocracy of industry has a longer history with a much larger record of failure, of mistakes and of exploiting the worker.

The growth of socialism and the intimacy between the labor unions and the socialistic parties is due to the same desire to escape the autocracy of industry, even, although in escaping therefrom, the worker may establish an autocracy of labor.

The present efforts in Great Britain to return to the Guild System of operation or a modified form thereof are due to the same cause, and it is not without interest to note that a prominent feature of the propaganda for this form of operation has been "the ownership of the tools of production by the workers engaged in the industry."

The labor occurrences in Italy indicate the out-cropping of the same desire, and it is this which has been at the back of the labor union development, the severity of its discipline and the strength of its organization.

The matter is mentioned here again because we have lost sight of the fact that the old feudalistic autocracy, out of which we have grown, was an economic autocracy and was associated with the political autocracy only because the economic advantage grew out of the land ownership, and land-ownership was a political matter.

It is mentioned also because endeavors to establish changes in industrial organizations must have as their basis a desire to create a fuller and freer discussion of matters pertaining to the work, the worker and the conditions of his work, and to provide him with a voice in the decision upon these matters, which will bring him into some share of the government of his own conditions in respect of industry.

The danger in the open shop lies in its misuse by short-sighted manufacturers who imagine that this open shop will enable them to return to the older and more completely autocratic methods of control and oblige the worker to accept their authority and their decision without regard to his desires or his own feelings upon the matter.

The president of an organization of manufacturers not long ago read to the body assembled a letter from a labor union to its members, in which there appeared the sentence: *"They will get busy one of these days, and when they do we must be ready to repair the damage done."*

When this sentence was read, the president of this association of manufacturers added the parenthetical remark: *"God help them when they do!"* and the remark was applauded by the assembled party. Any statement which that manufacturer and that association may make, as to the labor leader's autocratic control of a labor union, must be discounted completely because the expression which he has used is a complete indication of the autocratic control which he intends to exercise over his own workers.

It is power in industry, exercised by men of this type, which increases the bitterness and which defers any reasonable prospect of solution. Industry will not be benefitted by those who fight for domination on either side, and it is up to the industrial leaders and manufacturers who control the tools of production and distribution and who therefore control the destinies and possibilities of the workers, to take the vs. from between capital and labor themselves, by their own study, their own knowledge and their own far-sighted action in connection with the manufacturers.

The manufacturer who thinks that the present situation will settle the labor problem for him and that he has no need to look at the stream before it is necessary to bridge it, is imagining vain things. These human tendencies are too deep and they have been developing strength for too long to be disposed of by a temporary economic condition. In Europe they transcend all other questions and in this country they will eventually transcend all other questions, unless we employ sufficient intelligence and human understanding to lay the foundation for their settlement.

It took a good many centuries for the workers under the old feudal system to destroy feudal autocracy. The movement of trade unionism and the movement of socialism have grown very rapidly in just over a century, so rapidly that we are in danger of failing in our recognition of this growth. The direction of the movement is unmistakable. The strength which it has gathered is definite and the lesson which it carries to the manufacturers should be easily read.

This lesson is: **The solution of the problem lies in a degree of square dealing, wisdom and study which the unions have never attempted and with which they are unable to compete.**

Asphalt Roadway Specifications

THE Asphalt Association has ready for circulation in printed form the following typical specifications prepared by its technical committee, which is composed of highway engineers and specialists. In the preparation of these specifications special attention has been paid to form and arrangement with the idea of making them definite, concise and free from ambiguities.

A-1 Asphalt Macadam Surface Course.
A-2 Asphaltic Concrete Surface Course (Coarse Graded Aggregate Type).
A-3 Asphaltic Concrete Surface Course (Fine Graded Aggregate Type).
A-4 Sheet Asphalt Binder and Surface Courses.
B-7 Asphaltic Base (Asphalt Macadam Type).

A limited number of the following specifications in mimeographed form may also be obtained upon request:

A-5 Asphaltic Concrete Binder and Surface Courses.
B-1 Gravel Base.
B-2 Macadam Base.
B-3 Reconstruction of Old Macadam to Serve as Base Course.
B-4 Telford Base.
B-5 Portland Cement Concrete Base.
B-6 Truing Up Old Pavements to Serve as Base Course.
C-1 Preparation of Subgrade.
C-2 Sub-base.
C-3 Shoulders, Headers, Curbs and Gutters.

Specifications for Asphaltic Base (Asphaltic Concrete Type) will be available for distribution in the near future. The address of the association is 25 West Forty-third Street, New York.

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42 Legislatures!

THE elections are over, but it is not by any means the time for business men to forget their interest in politics and government. Indeed, it is time to begin to get interested.

Forty-two legislatures will meet shortly after New Year. Think of it! Forty-two bodies that will convene with their minds filled with ideas of revising taxes and eliminating trouble and death from the traffic situation.

This means, of course, that each of these forty-two law-making bodies will have automotive vehicles on their collective minds. The motor car and its less spectacular brothers are in the public eye as never before. Just as the industry has been the object of a more or less jealous drive of every other industry, so the vehicles will be the object of a drive for revenue taxes from all sources that are seeking to escape some degree of taxation.

The coming period will be one that will require cool heads and thoughtful consideration on the part of men who must advise, intelligently and fairly, these law-makers in their work of legislation. The representatives of the automotive industry should prepare themselves for effective and intelligent lobby work. They should have reliable statistics. They should have a copy of the "Proposed Uniform Vehicle Law" which the N. A. C. A. and other national organizations have drafted and then use these effectively.

Wages and Selling Prices

A SUCCESSFUL Chicago manufacturing concern on three occasions within the last year found it necessary to reduce prices on certain lines in order to successfully meet competition. Since their previous prices had not been excessive, it was necessary that some change in production take place if the lower price were to be made and a fair profit still realized.

It was decided that increased efficiency and increased production per man was necessary in order to meet the condition successfully. To obtain this result, the men in the shop were called together by the superintendent, the situation was explained to them, and they were shown that if they increased their efficiency the firm could meet this new condition, continue production without interruption, and thus provide steady jobs for them through slack periods. Then a general raise in wages was instituted.

This procedure occurred three times during the last year and a half; the last time being about six months ago. In every case, the men as a whole appreciated the aims of the management, and in every case the desired production results were achieved. A few men, of course, played the part of the "yellow dog," but the superintendent of this plant is authority for the statement that the number of this type was so small as to affect but slightly the generally good results.

"In order to reduce your price and yet maintain the same fair profit, increase wages." This statement may sound foolish; it is foolish, in fact, if considered alone without relation to a number of other factors. Yet it is interesting to note the case of a firm, doing a large business with the automobile manufacturers, that has done just that thing—and a number of other things. And this particular firm is now operating with its full complement of men, on full time, and is working four evenings a week overtime. Quite a record for a time generally considered to be one of business depression.

It is always dangerous to draw general conclusions from a single example or experience, but when such excellent results have been achieved they are at least worth noting. And it is worth consideration when discussing the possibility and desirability of lower wages in the near future.

Strengthens the Farm Market

THERE has been a considerable turn of sentiment recently against the "uplifter" and his work among the farmers. This note was sounded strongly at the recent convention of the National Implement and Vehicle Association. Now we have a letter from

a reader of AUTOMOTIVE INDUSTRIES who has much interest in farms and farming, as well as in automotive vehicles. His advice is practically that which the N. I. V. A. has adopted as its platform, and which our correspondent suggests that the automotive industry adopt.

This is briefly that the entire country quit extending pity to the farmer and farm boy, but consider them as members of the biggest producing and manufacturing interest in the world. Consider the farmers as business men and analyze their problems as you analyze the problems of other industries. When you talk transportation to a farmer, talk it just as you would to the owner of a steel plant. When you talk loans to a farmer, talk to him just as you would to another manufacturer, but keep in mind his slow turnover of his stock. Remember always that the farmer has financial problems of his own that are real, not fancied, and that his plant is quite equal in worth to a good many merchants and manufacturers who buy transportation.

The farmer is the biggest bank depositor and what he needs is confidence to talk straight business to his banker, not encouragement to put himself in the position of a suppliant, asking for this loan as a public benefit. The manufacturers are making long strides toward the elimination of professional "welfare" from their own overhead, now they should do equally good work in eliminating the professional "uplift" from the farm situation. It would do much toward making the farm market a stable market.

Exchange and Exports

THE upward turn of foreign exchange during the first part of the Thanksgiving week should be gratifying to all exporters of American goods, particularly automotive products. The exchange situation in the markets of the world is practically the only bar to continued heavy buying of the automobiles, trucks, tractors and tires manufactured in the United States. When the values of foreign currencies reach a more normal level, an expansion of automotive exports should ensue that will dwarf the recent movements.

But that is perhaps thinking too far ahead. The ascending curve that has been so remarkable in the last few days may not mark the definite and final turning point, but it is at least an indication that business is reaching again toward a stabilized basis. Exchange goes upward or downward as trade balance ascends or descends and foreign business, which includes both imports and exports, must strike an equilibrium so that each country may sell to and buy from other countries the particular goods of its production.

Automotive equipment is one of the particular goods of American production, which we offer on the foreign markets in exchange for the finished goods and raw materials. The present movement of exchange may prophesy the coming normalization of these exchanges. If so, the curve of automotive exports should ascend as does the currency movement. No other bar exists throughout Latin-America, the Far East, England, North Europe, Spain, Africa and other parts of the world which form the principal sales outlets for our manufactured goods.

But, the idea can not be accepted that foreign trade in automotive equipment has reached the low level that characterizes other lines. The export figures for October, which should be available shortly, are expected to show an unexpected volume of this business —sufficient to warrant a warning that no manufacturer can afford for one minute to let up on his cultivation of the foreign markets. The trade volume is high in those countries having the better exchange situation.

When it is considered that the Argentine, for instance, or China is nearly a month distant from the United States, with another month required for completing any transactions except by cable, it becomes apparent that manufacturers are not working now for to-day, but for two, three, four and even six months in the future. Therein does the foreign market differ from the domestic. What will be the exchange conditions in China and Brazil six weeks, ten weeks from now—that is what the automotive exporter must bear in mind in considering his sales policies, his advertising, his service and his business of the foreign field.

Thus, we work back to the exchange movement. Compare the currency values of to-day with what they were one week ago and two weeks ago. Then determine whether or not you can afford to let up on foreign trade which has been for many weeks the only bulwark of many companies from an actual and total cessation of business.

Sound Reasoning Required in Engineering Advertisements

IN writing advertising copy applying to engineering products, it is not a bad plan to introduce some technical reasoning, but it is most important that this reasoning be logical; for advertisements of this character are intended to appeal chiefly to the technical man, and if the reasoning will not stand the test of a rigid analysis the effect on the reader is likely to be of a negative character.

In a recent advertisement, the shifting of the center of load on a truck axle when the truck is on a side slope is discussed and illustrated. A plumb line is dropped from the top of the load centrally at the rear, and strikes the ground at the middle of the right hand rear tires. The intersection of the plumb line with the rear axle is marked, and it is intimated that the center of load on the axle is shifted from the center of the axle to the point thus marked.

The error in the illustration is that the plumb line should pass through the center of gravity of the whole load on the axle, instead of being held centrally at the top of the load. This latter method gives a greatly exaggerated impression of the shifting of the load with slight side slopes, especially if the useful load consists of light material and is very high. The center of gravity of the load on the axle is located even below mid-height of the useful load, because the springs, frame and body are below the useful load or pay load and have considerable weight.

Durant Sells General Motors Stock

Morgans-duPonts Now Hold Control

Two Great Houses Prove Faith in Industry—Durant Will Not Retire

NEW YORK, Nov. 23—Control of the General Motors Corp, next to United States Steel, the most colossal industrial enterprise in America, has been acquired by the duPonts and J. P. Morgan & Co. Their ownership of more than 50 per cent of the "billion dollar a year" company was accomplished by purchase of the speculative holdings of W. C. Durant. This does not mean, however, that he will retire as a dominating figure in the industry for he undoubtedly will become chairman of the board of General Motors.

The organization of General Motors closely resembles that of the United States Steel Corp., also under the domination of the Morgan interests, and it is accepted as certain that the position which will be occupied by Durant in future will be analogous with that of Elbert H. Gary in his gigantic combination. Speculation in the industry centers around who will succeed Durant as president but no announcement has been made covering this point. There is little doubt, however, that it will be a production man who will have supervision over the operation of the 59 or 60 units in the organization. That will leave Durant free to devote to finances his genius in that direction.

No general shake-up in the general organization or in the various divisions is expected. Numerous changes in the general management of individual units have been made of late and the tendency has been to place in executive positions younger men who have ability backed by the energy of comparative youth.

No further expansion is looked for in the near future although the abundance of capital now back of the corporation would make it possible to take over well-established concerns which may be in temporary financial difficulties if it were deemed advisable. The possibilities before the powerful group which controls the greatest combination in the automotive industry are limitless.

Most of the reports which came into being almost simultaneously with the passing of control are without foundation, however, and are on a par with the outpourings of the rumor foundry for the past few months. The persistent report recently that the John N. Willys interests were to be acquired by General Motors were denied at the time by duPont, Willys and the Morgans.

This story is now more persistent than before. It is closely allied with another that Willys is to take over the Maxwell-Chalmers organization. This is characterized as "bunk" by a banker who is a director not only of the Maxwell company but of many of those in the Willys group. Another angle of this report is that Walter P. Chrysler, now executive vice-president for Willys and formerly a vice-president of General Motors, will return to the latter organization, but this also is denied. In the last published list of holders of more than 5000 shares of General Motors stock, Chrysler was credited with having 8772 shares. On the present basis of 10 to 1, this would be equivalent to 87,720 shares.

The acquisition of control of General Motors by the Morgans and the duPonts was not entirely unexpected to those who had followed the affairs of the company closely. The duPonts have been the largest individual stockholders since 1918 but their alliance with the house of Morgan began only last June.

As a matter of fact it is generally admitted that the two great groups of financiers were active rivals on the market last February in the purchase of General Motors securities and that their operations were responsible for the wide fluctuations in market values of the stock.

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LIST OF GENERAL MOTORS UNITS COVERS EVERY PHASE OF INDUSTRY

Many men in the automotive industry who consider themselves thoroughly familiar with all its ramifications would find it difficult to draw a diagram of the General Motors Corp. Its magnitude is better visualized with a list of its scores of units. Here they are:

PASSENGER CARS AND TRUCKS

GENERAL MOTORS GROUP:
- Buick Motor Div., Flint.
- Cadillac Motor Car Div., Detroit.
- General Motors Truck Div., Pontiac.
- Oakland Motor Car Div., Pontiac.
- Olds Motor Works Div., Lansing.
- Scripps-Booth Corp., Detroit.
- Sheridan Motor Car Co., Muncie.

CHEVROLET GROUP:
- Chevrolet Motor Co. of Mich., Flint.
- Chevrolet Motor Co. of N. Y., Tarrytown.
- Chevrolet Motor Co. of St. Louis, St. Louis.
- Chevrolet Motor Co. of Texas, Ft. Worth.
- Toledo Chevrolet Motor Co., Toledo.
- Chevrolet Motor Co. of Bay City, Bay City.
- Chevrolet Motor Co. of Kansas City, Kansas City.
- Chevrolet Motor Co. of Atlanta, Atlanta.
- Chevrolet Motor Co. of Minn., Minnesota.
- Chevrolet Motor Co. of Cal., California.

GENERAL MOTORS OF CANADA, LTD.:
- Canadian Products, Ltd., Div., Walkerville.
- Chevrolet Motor Co. of Canada Div., Oshawa.
- McLaughlin Motor Car Div., Oshawa.
- Olds Motor Works of Canada Div., Oshawa.

TRACTORS AND IMPLEMENTS:
- Samson Tractor Div., Janesville.
- Samson Tractor Co. of Cal., Stockton.

ACCESSORIES

UNITED MOTORS GROUP:
- Buffalo Metal Goods Co., Buffalo.
- Dayton Eng. Laboratories Co., Dayton.
- Harrison Radiator Corp., Lockport.
- Hyatt Roller Bearing Div., Newark.
- Jaxon Steel Products Div., Jackson.
- Klaxon Co., Newark.
- Lancaster Steel Products Corp., Lancaster.
- New Departure Mfg. Co., Bristol.
- Remy Electric Div., Anderson.

MISCELLANEOUS
- Champion Ignition Co., Flint.
- Dayton-Wright Co., Dayton.
- Delco-Light Co., Dayton.
- Frigidaire Corp., Detroit.
- General Motors (Europe), Ltd., London.
- General Motors Export Co., New York.
- Sunnyhome Electric Co., Detroit.
- United Motors Service, Inc.

CENTRAL PRODUCTS DIVISION:
- Central Axle Div., Detroit.
- Central Forge Div., Detroit.
- Central Gear Div., Detroit.
- Northway Motor & Mfg. Div., Detroit.

MUNCIE PRODUCTS DIVISION:
- Muncie Parts Div., Muncie.
- T. W. Warner Plant, Muncie.

SAGINAW PRODUCTS DIVISION:
- Central Foundry Div., Saginaw.
- Central Motor Div., Saginaw.
- Jackson-Church-Wilcox Div., Saginaw.
- Saginaw Malleable Iron Co., Saginaw.

GENERAL:
- Michigan Crank Shaft Div., Lansing.
- St. Louis Mfg. Corp., St. Louis.
- Dayton Metal Products Co., Dayton.
- Domestic Engineering Co., Dayton.
- Doylestown Agricultural Co., Doylestown.
- Fisher Body Corp., Detroit.
- General Motors Acceptance Corp., New York.
- Industrial Terminal Corp., Detroit.
- Janesville Machine Co., Janesville.
- Lancaster Steel Products Corp., Lancaster.
- Bearings Service Co., Detroit.
- Brown-Lipe-Chapin Co., Syracuse.
- Doehler Die Casting Co., Brooklyn.
- Durant Building Corp., Detroit.
- Flint Varnish & Color Wks., Flint, Mich.
- Independent Lamp & Wire Co., Weehawken.
- Consumers Power Co., Durant Hotel Co., House Financing Corp., Hyatt, Ltd., Lansing Home Building Co., Modern Housing Corp., Novelty Incandescent Lamp Co., Wisconsin River Power Co.

Truck Managers Discuss Problems

Greater Co-operation with Dealer Urged

Selection of Responsible Distributers Important — Judicious Advertising and Selling Urged

DETROIT, Nov. 19—Secretary of Agriculture B. T. Meredith urged concerted action by motor truck manufacturers in promoting the agricultural industry as the very foundation of their business in an address before the convention of the National Association of Truck Sales Managers here. Two hundred members of the association and guests attended the banquet. Secretary Meredith and W. R. Wilson, vice-president of the Irving National Bank, New York, who spoke of the relations between the truck dealer, manufacturer and banker, were the principal speakers. Mr. Wilson gave the sales managers good points in promoting banking relations.

The banquet followed two interesting sessions of the association, the first being devoted to business matters and election of officers for the ensuing year. H. T. Boulden of the Selden Truck Corp., was elected president to succeed J. E. Tracy; E. T. Herbig of the Service Motor Truck Co., vice-president, and A. E. Shafer of Gramm-Bernstein, secretary-treasurer. Directors for one year were elected as follows: A. C. Burch, Clydesdale; W. K. Ackerman, Louis-Hall; E. D. Hand, J. C. Wilson Truck Co.; two years, Mr. Herbig, Mr. Shafer and Homer Hilton of Oshkosh; three years, Mr. Tracy, Mr. Boulden and W. A. Clare of Atterbury.

Moock and Howson Make Speeches

The afternoon session was devoted to addresses by Harry Moock, manager of the N. A. D. A., and E. T. Howson, engineering editor of *Railway Age*. Moock, using charts, dwelt chiefly on the organization and functions of the dealers' association and the necessity for co-operation and a get-together spirit among all sections of the automotive industry.

Howson gave the sales managers some good points in connection with the efforts of co-operation between the motor truck and the railway, and urged less attempt at competition and a stronger effort to make the railway an ally and a consumer rather than a competitor.

One of the most important features of the business meeting was the determination to develop a plan of closer co-operation between dealers and manufacturers. Following lengthy discussion, the president was empowered to name a committee of four to devise ways and means for developing a plan of meeting with dealers at intervals for an interchange of ideas between the manufacturing and selling ends.

Wilson declared factory functions were divided into four cylinders, as he termed it, manufacturing, selling, accounting and finance. The sales department, he said, not only must sell the product but sell the institution as well. He urged co-ordination of effort and close co-operation between the manufacturing and selling ends as the chief requisite for success.

Readjustment Time for Study

"This period of readjustment," Wilson said, "while harassing, is in reality a time for preparation and a splendid opportunity for examination into company affairs. If you have been blinded by the glare of prosperity, this is the time for you to begin to take stock of yourselves and prepare for the resumption that is bound to come, that you may be personally fitted to conduct your affairs on a strictly sound business basis.

"This is your opportunity to synchronize your sales and manufacturing, and unless the two stick close together, you cannot adequately meet the flood tide or the ebb tide. This slump should furnish you valuable experience with regard to your inventories and the necessity for keeping them more evenly balanced. It gives you a time for adjusting your inventories and a time for sober reflection that must show you the absolute necessity of close relationship of all departments for the successful conduct of your business."

Referring to the retail selling end and the sales managers' trouble in that direction, Wilson said, the passenger car with several years lead had been able to grab the cream among distributers, and in those who were left for the truck manufacturer many have been wanting. He declared that many truck dealers were not qualified financially, while the moral qualifications of many others were away under par. He urged improvement of selling organizations and selling and advertising methods.

Must Get Advertising Results

Advertising methods, he said, necessarily reflect the quality of the advertiser's business and declared that millions of dollars had been wasted in the wrong kind of advertising.

"No one will be so narrow minded as to think of stopping advertising," said Wilson, "but it must be judicious advertising. You truck men have been highly favored in the propaganda that has been spread since the beginning of the war in behalf of the motor truck as an aid to transportation. The general publicity going out telling of the help of the truck

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Houston Opposes Change in Taxation

Treasury Can't Finance Private Business, He Declares—Must Pay on Profits

WASHINGTON, Nov. 22—Requests made to the Treasury Department by manufacturers that the time for payment of the income taxes due Dec. 15 be extended and that the "net loss" provision of the Revenue Act of 1918 be applied to the year 1920 are vigorously opposed by Secretary Houston. The agitation in this direction was undertaken on behalf of groups of manufacturers by Daniel Roper, former Commissioner of Internal Revenue.

"The agitation for these changes can only do harm," Secretary Houston asserted. "To extend the time for the payment of the Dec. 15 installment would simply mean that the Treasury would in effect be financing private business, which should provide for itself through ordinary banking channels, if necessary. In this respect the proposal is not different from those insistently made to the Treasury during the last few months, that Government funds be made available in various sections of the country to finance the holding of commodities or the export of goods to Europe.

"The suggestion that the 'net loss' provisions of the Revenue Act of 1918 be extended to the year 1920 is equally impossible from the point of view of the Treasury. Under the present revenue law the Treasury receives in the year 1920 taxes based on the income and profits of taxpayers during the year 1919. The whole financial program of the Government requires that the Treasury rely upon the collection of these taxes.

Must Make Certain of Receipts

"No change should be entertained which would render uncertain the bulk of the Government's tax receipts and perhaps result in heavy claims for refunds with consequent increases in the public debt and additional short-term financing. There is, furthermore, no reason in fairness why taxpayers who made profits in 1919 and became liable to pay taxes on the basis of these profits should now be permitted to throw upon the Government the burden of losses incurred in the conduct of their own businesses in the year 1920.

"The Treasury must of necessity promptly meet the Government's bills. If uncertainty is to be introduced now into the tax payments upon which the Treasury principally relies, it clearly will be impossible for the Government to finance itself."

Tire Dumping Check Sought in England

Heavy Shipments from America Asserted Flooding Markets and Breeding Unemployment

WASHINGTON, Nov. 19—Diplomatic and trade observers here have manifested unusual interest in the efforts of British industrial concerns to shut off the volume of exports from this country, particularly motor tires. The British government, it is said, have made it clear to the industries and labor organizations that a new measure is intended to restrict so-called "dumping" of American tires on British markets.

The subject has claimed the attention of Parliament for some time. A joint deputation of employees and employers waited on the President of the Board of Trade in London recently with the demand that legislation be enacted to check the sales of American tires. The claim is advanced that the heavy shipments from American manufacturers flood the markets, and, as a consequence, the demand for home products falls off. Labor officials say that thousands of rubber workers are unemployed because of American competition.

In the discussions with Government officials British tire makers and employees cited import statistics to show that 90,000 tires entered England during September, principally from the United States. It is contended that the stagnant condition of the tire market in this country allows American manufacturers to ship their products to foreign markets at lower prices. It is further charged that the British tire industry would soon be destroyed if the importation maintained the present volume. These conclusions were reached by an estimate of 210,000 motor vehicles for the consumption of tires and a life of 5000 miles for each tire.

It is understood here that the pressure of employers and employees will be sufficient to force a restrictive measure through Parliament. The argument which is often used effectively in this respect has reference to the fact that unemployment pay is now a charge upon the State.

France Joins England in New Oil Combine

LONDON, Nov. 5 (*Special Correspondence*)—According to the American Chamber of Commerce in London, the formation of the new Anglo-French combine between the Anglo-Persian Oil Co., and a French group with a capital of 4 millions sterling for the importation into France of crude and refined oils, and for the refining and distribution of petrol is looked upon as being a necessary corollary to the San Remo agreement between Britain and France regarding the allocation of the Mesopotamian oil.

By the new agreement the Anglo-Persian Oil Co. will obtain a new market for their oil and British industry is expected to benefit by the manufacture of the necessary refining plant. Oil tankers are already being built in British yards in connection with the scheme.

The formation of the combine is said to be the reply to American activity which has been taking place in France, where the Standard Oil Co. has already a subsidiary undertaking. In addition, a Franco-American Oil Co. has recently been formed for the purpose of constructing oil tanks and pipe lines.

The American Chamber in London adds that the British Government is a large holder of the Anglo-Persian oil shares, and in 1914 subscribed at par for two million ordinary £1 shares, 1000 preference shares of £1 and £199,000 debenture stock, by which subscriptions they secured the controlling interest in the company. Last year when the capital was increased the British Government was declared to have subscribed for their proportion.

Rubber Association to Gather Statistics

NEW YORK, Nov. 22—The Rubber Association of America has undertaken the gathering of monthly statistics from individual tire manufacturers who are members of the Tire Manufacturers' Division, relative to inventories, production and shipments of pneumatic and solid tires and inner tubes, as well as the amount of cotton fabric and crude rubber consumed. The association will supply each member participating in the arrangement with the totals compiled from the individual returns. A report of total inventories, production and shipments as of Nov. 30 probably will be available early in December.

The regular annual meeting of the association will be held at the Waldorf-Astoria in this city, Monday, Jan. 10. The 21st annual dinner will be served the evening of that day. The next meeting of the executive committee of the Tire Manufacturers' Division will be held Dec. 15.

SUPERIOR NEARS COMPLETION

BENTON HARBOR, MICH., Nov. 18—The first unit of the new malleable iron foundry of the Superior Steel Castings Co., has been completed and machinery is being installed to permit the starting of operations Dec. 1. The buildings are of steel and concrete, the main bay being 132 x 360 ft. with two wings each 60 x 60, giving a total floor space of 54,720 sq. ft. One wing is to be used as a shipping room and the other as a core room. The plant is so constructed that the raw material moves straight through from the yard to the shipping room to be tagged for delivery. The plant covers three acres and is so constructed as to permit of its being enlarged to six times the present capacity. An addition to the power house and a huge air compressor also have been completed and a steel crane runway.

Goodyear Surplus Due to Car Drop

President Seiberling Tells Stockholders Heavy Inventories Followed Curtailment in Orders

AKRON, Nov. 23.—Formal statement to the stockholders of the Goodyear Tire & Rubber Co. common stock on the financial conditions of the company and the methods adopted by the company's officials to meet the present situation has been issued over the signature of F. A. Seiberling, president of the corporation.

The statement declares that it is inevitable that Goodyear should be affected by the recent business depression as for several years it has been supplying 50 per cent of all tires used on new cars, and in order to protect these large customers it was necessary to keep generous reserves of raw material on hand and on order.

When, within the last five months, automobile production has been reduced from the highest peak to a point below normal it was reflected in the orders and while prompt action was taken to curtail raw material supply it was impossible to prevent inventories from piling up, the statement asserts.

The main problem was to provide adequate finances to carry the inventories, which was met by arrangement with a group of banking interests for a temporary loan of $25,000,000, it stated.

The increase in sales for the fiscal year ending Oct. 31, of approximately $38,000,000 over the fiscal year ending Oct. 31, 1919, and the growing business on other commodities made by the company also is referred to as an indication as to the safety of the money invested in common stock.

President Seiberling's statement followed a statement issued by the company announcing that at a meeting of the directors Nov. 13 the decision was made to pass the regular quarterly dividend. The directors' statement is to the effect that the dividend is not forthcoming "in view of the present financial and business conditions and in order to conserve resources of the company."

MICHIGAN ROAD FUNDS AMPLE

DETROIT, Nov. 20—Besides caring for the overhead in the State Highway Department, Commissioner F. F. Rogers said to-day the automobile revenues would be amply sufficient to pay the approximately $2,000,000 State aid money for good roads in 1922 and the more than $3,000,000 in 1923. The department now has under construction or contracted for, between 400 and 500 miles of Federal aid roads to cost $6,000,000 and 600 miles of trunk line road to cost $10,750,000, available under the good roads amendment. There also is a stretch of 400 miles of assessment district roads, the cost of which cannot be determined definitely because the counties in most instances are shouldering the burden on a cost basis.

Medium Car Place Given to America

Vauxhall Official Says British Competition in This Class Not Serious

BOSTON Nov. 20—No serious competition against America in the medium-priced motor car field in Great Britain will crop up for years yet in the opinion of A. J. Hancock, M. I. A. E. F. R. S. A., works manager for Vauxhall Motors, Ltd., of Luton and London, who is touring America to observe industrial conditions and who is now in Boston.

England is taking care of its own demand for low-priced motor cars and also for the better grades of motor transportation. In the low-priced field, cycle cars and similar models are in favor and are turned out by home factories. In the production of high-cost machines England asks no odds of any other nation. In the field that lies between, notably the demand for cars that, in America, cost from $1200 to $2000, no widespread attempt is being made by English manufacturers to meet the need.

But in the opinion of Hancock, American motor car manufacturers have not paid sufficient attention to all the demands of their British market. With a few alterations, and a little finer detail of finish and appointment, such as could easily be applied, American medium-priced cars could be made more serious competitors than they now are. It is a matter of taste and the average Englishman is slow to change his ideas, but wants things as he likes them.

Hancock observed the volume of production in America and said: "There is every sign of material prosperity, but with the exception of motor cars, prices rule too high.

"I am not despondent over England's future as a result of my visit," declared the automobile engineer. "What I have seen simply means that the English must work just a shade harder in industry and that people of our operative class need to lend themselves to the arts of quantity production in a manner they are now disinclined to do.

England Must Watch Production

"It is a spectacle in this country to see able-bodied workmen doing repetition work so fast and with such apparent interest. They do it much faster than the English worker, who uses the same appliances. We must change this in England in order to hold our place against American competition in the markets of the rest of the world.

"American enterprise rides to a big gain or a big fall. American capitalists take bigger risks. For instance, in your business life the heads of a firm will say 'let's lay down a million more feet of floor space' as readily as English business would say 'let's lay down a thousand feet.' The expression on the face of the average American business man reflects the feverish activity of his brain.

"I am of the opinion that America has lost the sense of the ideal in its successful search for quantity production. The Englishman is more inclined to do the job for the job's sake, rather than for immediate profit in cash. He sets less store by the tangible things of life.

"As to the future of your automobile industry, I believe it is assured for those who produce as an engineering science. Many of the cheaper cars, rushed into production at the height of a feverish demand, I do not believe will survive.

Better Cars Lacking in Design

"Your better class of motor cars lack the simplicity of design and the taste in finish that is expressed in the English product. If we were to take over the manufacture of some of your best-known motor cars we would first simplify the design and do away with many parts. For instance, Vauxhall cars, at the present rate of exchange, are priced in the neighborhood of $4,000. Compared with American cars in this price field they will do all your products will do, at less expense, with less complication—and are a perfectly turned-out job. Many American cars of the better class are too heavy—too extravagant in the use of fuel.

"I am perplexed over the fuel situation. In our country the high cost of petrol compels economy. Motor design of the future must turn toward more economical motors. If every motor car—every Ford car, even—was to reduce its fuel consumption 10 per cent the price of petrol would drop 50 per cent. I am of the belief that the automotive engineers will solve the problem and that a gasoline mileage of between 30 and 40 miles to the gallon is not improbable for the touring car of the future.

"Racing in England has done much toward the present development of the motor car, particularly in reducing its weight, and it will be continued. Vauxhall Motors, Ltd., is enlarging its plant by adding 45,000 feet of floor space. We plan to produce the finest machine that can be turned out, regardless of expense."

Hancock declares his company is planning no "invasion" of America with its product, but that it will produce its wares for those who want them.

Warehoused Cars Lead to Price Drop Belief

LOS ANGELES, Nov. 20—The used car situation here remains bad. It is the direct result of the recent price upset and at this time the dealers say they cannot approximate the time when improvement will be shown. Price uncertainty has made the trade-in a very skeptical value with the new car dealer and the exclusive used car dealer is finding troubles more numerous than ever.

The accumulation of new cars that are being put into storage is not helping the used car market a bit. A large percentage of the public holds to the belief that some day there will be applied a reduced price to these cars in warehouse and that will make owners of used cars have a better chance to trade for new cars.

Special Cables

French Plants Wait Pay for War Work

Government Insistence That Profits Tax Be Paid First Threatens Disaster

(*By Cable to* AUTOMOTIVE INDUSTRIES)

PARIS, Nov. 22—Failure of the French Government to pay for war contracts and insistence at the same time by the Department of Finance that war profits taxes be settled, has resulted in many firms connected with the automotive industry being placed in a difficult position. Bleriot, employing 1300 hands in its airplane factory, found it impossible to get payment from the state and consequently closed its factory, declaring it had no funds in hand to pay the workers. This caused a protest by the men who threatened to take possession of the works and run them on a communist basis. After the plant had been closed four days the Government paid Bleriot 800,000 francs on account and operations were resumed. This incident caused a stir in the industry for Bleriot shut down at a time when there was plenty of work on hand.

It is quite possible automobile firms will follow the action of Bleriot if the State insists upon collecting war profits before paying for contracts completed two years ago. Although the Government owes Darracq 3,000,000 francs the Finance Department insists that war taxes must be paid at once. Darracq refuses to give way on this point.

It is reported Berliet has sold the steel rolling mills at his new Venissiex factory to a St. Etienne syndicate for 25,000,000 francs. These buildings have not been completed. Berliet will limit his activities to the construction of a new 16 hp. passenger car and a 1½-ton truck. Men are being taken on for automobile work.

Production at Lowest Point

Production in the French automotive industry is now at the lowest point ever recorded. De Dion has laid off 700 more men; Darracq has cut its staff 50 per cent; Tatil has laid off 320 out of 980; and Saurer has reduced 30 per cent.

French manufacturers now regret abandonment of the annual show and are starting an agitation for an exhibition in March or April. It is hardly likely to succeed, however, for no hall will be available at that time.

Rules for the French semi-Diesel engine competition have been withdrawn and will be revised.

Gasoline Production Reaches High Mark

September Figures Show Gain on Output of 1919 But Reserves Decline

WASHINGTON, Nov. 22—Comparative analysis of production and consumption of gasoline for the first nine months of 1918, 1919 and 1920 as compiled by the Bureau of Mines to-day shows evidence of improvement in the gasoline situation. Despite the heavy increases in domestic consumption and the export trade, the stocks on hand Sept. 30, 1920, were considerably larger than in the corresponding period in 1918 but less than last year. The refiners produced a daily average of 15,129,370 gal. of gasoline during September this year as against 11,318,419 gal. during the same period in 1919.

The refineries reported 288,195,394 gal. of gasoline on hand Sept. 30 as against 269,772,723 in 1918 and 371,125,419 in Sept., 1919. During the first nine months ended Sept. 30, 1920, domestic consumption of gasoline amounted to 3,211,275,983 gal., a noteworthy increase over the corresponding period last year when domestic consumption aggregated 2,574,541,261. These figures reflect the increased use of internal combustion engines. Exports showed a high percentage of increase as 465,439,992 gal. were shipped abroad since January as compared with 268,166,964 gal. for the nine months in 1919. The foreign trade for this year exceeded 1918, regarded as the banner year because of the use of automotive equipment incident to warfare. Shipments to insular possessions for the first nine months this year amounted to 16,312,386 gal. and 12,889,050 gal. of gasoline in the same period last year.

Consumption of lubricating oils since January amounted to 477,340,535 gal. as against 389,636,571 gal. last year. The total stocks of lubricating oil on hand Sept. 30 was 130,449,829 gal. This figure represents a sharp reduction in reserve, for in Sept., 1919, there were 158,967,070 gal. of lubricating oil in stocks. The fact that there has been but little increase in the daily average production for three years easily accounts for this slump.

Recommend Regrouping in Export Statistics

WASHINGTON, Nov. 19—Grouping of automotive products and machinery has been recommended by the Foreign Commerce Department of the Chamber of Commerce of the United States after a study of the Government's classification of import and export statistics. The reclassification, it is claimed, will permit greater accuracy and afford business men a more intimate knowledge of the nation's foreign trade. The National Chamber will recommend their adoption at the December session of Congress so that the schedules may become effective at the beginning of the calendar year of 1921.

Exporters and others interested in foreign trade have complained of the inaccuracies of official statistics. It was found impossible to measure the volume of foreign trade under the caption "all other" which embraced many items.

Cut in Wages Denied When Overland Resumes

TOLEDO, Nov. 20—Vigorous denial that wages were cut at the Overland plant when 2000 men were taken back with the reopening of the parts department this week, was made by Vice-president Kilpatrick in charge of production. All of the men were taken back at their old wages he said. Kilpatrick added much was being done to the detriment of the industry by the circulation of such reports and he added that wage conditions in Toledo did not warrant a reduction of any sort when the men were taken back.

Resumption of operations in the parts department of the plant disposes of rumors—denied vigorously by Vice-president C. A. Earl—that the plant would be down indefinitely and other rumors involving abandonment of Overland 4 or substitution of the old model. Other departments of the plant will reopen as rapidly as inventories are completed, according to Kilpatrick and resumption in full is expected early in December.

October Employment Drops 22.5 Per Cent

WASHINGTON, Nov. 19—Statistics compiled by the Bureau of Labor Statistics concerning the volume of employment in October show a decrease of 22.5 per cent of the number on payrolls of 45 reporting establishments in the automobile industry as compared with the corresponding period last year.

The amount of pay roll also reflected a slump in manufacturing for it fell off 11.9 per cent, the aggregate of the reporting firms for a period of one week was $4,559,967 for this year as against $5,173,645 for the same period in 1919. The reporting concerns listed 160,413 employees in the week covered in 1919 while only 124,276 were employed in the same shops this year.

Only four industries showed increases in the number of persons employed, the largest growth being noted in the iron and steel business where the increase amounted to 57.3 per cent. Pay rolls increased in seven industries.

CONNECT NEW ORLEANS ROADS

SLIDELL, LA., Nov. 18—St. Tammany Parish, La., announces that it will issue $100,000 in bonds to build an improved highway from Slidell to the Rigolets to connect with the new Chef Menteur road from New Orleans, and thus give a direct hard-surfaced road from the north into the Louisiana port.

Pierce-Arrow Drops "48" Chassis Model

Will Concentrate Passenger Car Construction on One Model in Future

BUFFALO, Nov. 20—Only one model of passenger car chassis will be produced by the Pierce-Arrow Motor Car Co. next year. Heretofore there have been two models, a "38" and a "48." The new model has the same cylinder dimensions as the "38," viz. 4 x 5½-in., and is of the six-cylinder type, but it has been redesigned in many details and will have no model designation.

The speed range of the engine has been greatly increased, extending now from 200 to 3000 r.p.m., and the maximum output is nearly the same as that of the old "48." All six cylinders are now cast in a block and the cylinder head casting is detachable. The T head cylinder with dual valves is continued, but a sheet metal cover is placed over the cylinder head to enclose the spark plugs, cable connections and other fittings on top of the engine.

The Delco dual ignition system adopted last year is continued. Spark plug cables are enclosed in a metal conduit of rectangular section. The starting and lighting system is now also of Delco make.

The carbureter is a Stromberg and is located on the left side of the engine, an air passage from the air heater on the other side of the engine passing between cylinders 3 and 4.

The control has been changed so that the spark and throttle levers are on top of the steering wheel instead of underneath. An accelerator of the roller type is fitted. The gearset is mounted amidships and has only three forward speeds instead of four. The clutch is of the multiple dry disk type. A tire pump is mounted on the gearset and is controlled from the driver's seat.

Brakes and Springs Changed

Band brakes are now used instead of shoe brakes. The springs are half-elliptic, the rear set being nearly 5 ft. long and underslung. It is believed that the changes in spring suspension will materially improve the riding qualities of the car. The wheels are of the wood artillery type, and are now fitted with Firestone demountable rims with quick detachable channels. The tire size is 35 x 5-in. all round on all models except those for 4-passengers or less, on which the size is 33 x 5-in.

The headlights are integral with the fenders. The enclosed cars carry the lamps on brackets, but either type may be had on all models. The headlights are fitted with small driving lights for city use, and also have non-glare lenses. All enclosed cars are fitted with a heater. The Alemite system of chassis lubrication is regular equipment.

Industry Organizes to Liven Business

Milwaukee Manufacturers and Dealers to Act Co-operatively in Meeting Problems

MILWAUKEE, Nov. 22—The organization of the Milwaukee Automotive Manufacturers' Association, incorporated for the purpose of acting on conditions in the workshops of this industry locally, and steps taken by the Milwaukee Automotive Dealers Association to co-operate with H. J. Roesch, apprenticeship deputy of Wisconsin Industrial Conditions, are developing several features of a co-operative nature which, while dissimilar, are putting new life into the manufacturing and merchandising ends of the automotive business in Milwaukee.

During the past two years, owing to business pressure and conditions of an unusual nature, co-operative effort has been spasmodic, and the several component parts of the industry have been pretty well going their own way. This applies to groups as well as individuals. With business taking a new turn, with problems coming up that are not only inter-association but inter-industry in nature, vital steps are promised to be taken co-operatively this winter.

Steve F. Briggs of the Briggs-Stratton Co., president of the association, said: "The Milwaukee Automotive Manufacturers' Association was inspired by a feeling on the part of the manufacturers to have a group and secure representation in the Milwaukee Employers' Council. Its activities, as an organization, are touching upon all phases of the labor problem. There is no idea in this to build up a stone wall in front of labor, or anything of the kind, despite some reports from ill-informed persons. There will be an interchange of ideas and plans on welfare work, systematic hiring methods so that the better and proper man may be assured of proper consideration; this will avoid the loss to labor as well as employer from the mistakes of misfitting them into positions.

John P. Kelley, A. O. Smith Corp., is secretary-treasurer, and Walter Davidson of the Harley-Davidson Co., a director.

May Provide Apprentice System

R. C. Chidester, Packard Motor Car Co.; E. M. Jordan, West Side Buick Co., and H. W. Bonnell, Kissel Kar Co., as a committee of the dealers' association are now working out a schedule suggested by Roesch of the Wisconsin Industrial Commission for an apprenticeship system, for automotive mechanics. Service stations employing five or more hands will be included under a system of one apprentice for every five mechanics. There will be apprenticeship indentures, fixing the term of apprenticeship at four years, with constant educational work that will insure the apprentice a thorough training. Thus employers will be assured against depletion in the ranks of mechanics.

FUNDAMENTALS EXIST FOR STRONG INDUSTRY

ST. LOUIS, Nov. 22.—Evidence that the newspapers of the country are awake to the fact that temporary adversity can have no more lasting effect upon the automotive industry than it can upon steel or agriculture, is found in the following extract from an editorial published in the St. Louis *Globe Democrat*, one of the powerful papers of the United States:

"In the readjustments now in progress in the automotive industry there is no element of recession of the industry itself. The automobile is not going out of fashion or out of use. On the contrary, more people feel that they cannot get along without it than ever felt that way before, and more uses for it are being found. Especially is commercial use increasing, both of what has been called pleasure cars in the past and cars for transport purposes. The horse is rapidly going out as a motive power and automotive vehicles are also largely supplementing the railroads in the handling of freight. The great demand for new machines which followed the war was founded chiefly upon the unprecedentedly large incomes people were receiving and their unguarded expenditure of them, has slackened considerably, yet there is still a stronger demand for new vehicles than existed before the war, and this demand will continue. In addition to that, the number of vehicles has reached such a large total, variously estimated at 9,000,000 to 10,000,000, that the necessary replacements themselves constitute a larger demand than existed in total a few years ago. There will not be such an inducement for experimenters to take a flyer in automobile manufacturing as existed during the short period of unsatisfied demand, high prices and enormous profits, but the fundamentals of a sound and permanent industry of enormous production exist."

This is only one of many editorials now appearing.

A. B. C. REFRIGERATION CHANGES

CHICAGO, Nov. 19—The Annheuser-Busch Sales Corp., St. Louis, has taken over the sales and manufacture of the A. B. C. transfer refrigerating system as applied to motor trucks and has opened a sales office in this city. The A. B. C. Refrigeration Co., Chicago, will continue the manufacture and sale of the system as applied to railways and steamships. Heretofore the truck bodies carrying the system have been built by different manufacturers. Through the change in handling there will be a centralization of this effort.

N. I. V. A. to Increase 1921 Demonstrations

Plans Sectional Events to Promote Use — Seek Better Banking Attitude

CHICAGO, Nov. 20—An increased number of tractor demonstrations will be held the coming year by the tractor manufacturing members of the National Implement and Vehicle Association. These will probably follow on sectional lines. There will be no show before the one to be held in Columbus in February of next year. The program for shows for the year 1921-22 will depend a great deal upon the success of the Columbus event.

The question of unified advertising was talked over and left in the hands of a committee for recommendation. The suggestion of a national advertising campaign to sell the idea of the value of the tractor to the public, the farmer and the country banker was made by F. P. Mount of the Advance-Rumely Thresher Co. Mount said that the banker was by no means sold on the tractor idea and that the present attitude of the banks in the country is that the farmer must finance himself as far as tractors are concerned.

The campaign, if started, would sell the big idea of the tractor rather than exploit the merits of different makes. Mount in the course of his remarks stated that he had sent out a questionnaire to representatives of his firm in the field to learn exactly the position of the bankers. The opinion of nineteen such representatives was solicited. On the question of whether or not there are many bankers who believe that tractors are more or less experiments fourteen reported that such was the case and five reported in the negative.

In answer to the question as to whether the banker believes that tractor development will show more profit to the farmer, four of the representatives reporting conditions in their district advised in the affirmative while fourteen reported adversely and one was in doubt. Of the nineteen representatives only four said that the bankers were sure that production would increase through the use of tractors.

Banker Not Sold on Tractor

From this gist of opinion it was apparent that the banker has not been sold on the idea and that there must be some plan adopted toward educating him. It was also shown at the meeting that the surface need of tractors had been obtained but that there are many farmers who will have to be gone after. There are many producers who can be made good prospects.

Before adjournment the following officers were chosen for the ensuing year: Chairman, F. P. Mount; vice-chairman, H. B. Dinneen, Moline Plow Co.; secretary and treasurer, E. C. Merwin, Russell & Co.

Way to Help Sales Shown to Engineers

Pennsylvania Section Gets Dealer Viewpoint on Efficiency in Production and Inspection

PHILADELPHIA, Nov. 17—The November meeting of the Pennsylvania section, Society of Automotive Engineers, held at the Engineers' clubhouse, 1317 Spruce Street, had as its feature an address by W. H. Metcalf, manager of the Philadelphia branch of the Wire Wheel Corp. of America, on "What the Automotive Engineer Can Do to Assist the Dealer and Owner." The speaker was highly complimented by the engineers for his practical talk covering as it did the selling viewpoint and engineering problems.

Metcalf called attention to the fact that automobile salesmen not only believe in, but like to boast about how efficient is the corps of engineers of their particular factory and usually make this a strong selling point. He mentioned the value to the salesmen of individuality in the car they are selling and showed that this individuality, consisting in some feature that the "other car" does not possess, is a source of pride alike to salesman and customer.

"Mr. Engineer," continued the speaker, "it is absolutely essential that you should insist upon proper factory inspection. For instance, all cotter pins should be placed where you have designated them to be and lock washers should be in place and not forgotten. This is one way you can help the dealer and owner.

"Another thing," said Metcalf, "the changing of the size of spindles, bearings and axles on a current model works a very great hardship on the dealer. This is in the case where it has been shown at the factory that the model has not stood up well under a smaller sized spindle and that for eastern hilly country it will require a heavier one. Then this is changed in the same model and when it arrives the dealer has no parts to replace the changed size.

Thorough Tests of Cars Needed

"In such cases," added the speaker, "the engineering department should have secured, through tests, the right size spindles, bearings, and axles before permitting the car to be sold. Why should a dealer be compelled to carry three or four different sets of parts for one model car?" He suggested that the way to obviate having to carry too many parts was to standardize them.

Taking up further the necessity for proper inspection, the speaker said that dealers have much trouble over improperly inspected vehicles arriving from the factory sometimes minus vital details, thus endangering life of owner and driver. As a specific case of neglect of inspection, he mentioned that fluted axles sometimes arrive having too much play in the hubs.

"Fluted axles should always be sweated into the hubs," declared Metcalf. "Otherwise pretty soon the axle will be revolving and wheel standing still."

"Engineers," he said, "should strive to reduce the parts on cars, in place of increasing them. This will make it easier for both dealer and customer." He accentuated the need for engineers providing for the factor of safety in motor trucks and asserted that the weight of chassis and body must be reduced, otherwise the state highway officers would see to it that more restrictive legislation would be passed. "When it comes to engineers," said the speaker, "the U. S. A. far outdistances other countries, but our manufacturers run at high speed and frequently do not allow our automobile engineers time to fully test their designs and improvements before placing them on the market. While the manufacturers on the other side of the water have been theorizing and testing out new designs, our manufacturers have built the cars and placed them out to the dealer who, unfortunately, has to test them."

Washington Section of S. A. E. Organized

WASHINGTON, Nov. 20—At a meeting in the Cosmos Club last night, local members of the Society of Automotive Engineers organized a Washington Section. The meeting was opened by C. H. Young, who introduced Coker F. Clarkson, secretary and general manager of the society. Clarkson sketched briefly the origin of the society and its development to its present position. Capt. St. Clair Street, Air Service, followed with a very interesting talk on his flight to Alaska and return.

After the talks the Washington Section was formally launched and Dr. H. C. Dickinson of the Bureau of Standards was unanimously elected as chairman. Col. F. H. Pope was elected vice-chairman, Archibald Black, secretary, and Conrad H. Young, treasurer. An informal session followed, when the chair threw the floor open to all present for discussion of the proposed section activities.

MILWAUKEE SHIPPING GROWS

MILWAUKEE, Nov. 18—Milwaukee has been designated as an important transfer point for lake-and-rail shipments of motor cars from Detroit to the West. Recently the Chicago and Detroit Steamship Co. added Milwaukee to its ports of call and now it has received instructions from Dodge Bros. to make Milwaukee the place of transfer to all points West, instead of Chicago. This will mean that the railroads out of Milwaukee will handle more than 400 cars weekly for shipment West. As navigation closes within a few weeks, the volume this year will not be large, but the Dodge Bros. contract will be effective throughout 1921 and indefinitely thereafter.

Space Goes Quickly for Transport Show

Twenty Truck Makers Take All but 1000 Feet at New York Exhibit

NEW YORK, Nov. 19—Approximately 22,000 feet of the 23,000 feet available for motor truck exhibits at the Highway Transportation Show to be held in this city, Jan. 3 to 8, was drawn for this week at the offices of the Motor Truck Association of America, under whose auspices the show will be held.

The representatives of twenty prominent makes of trucks were at the drawing which was made by lot, those contracting for the greatest amount of space having the first choice. Those who drew first were A. M. Welch, representing Reo; P. N. Lineberger, representing Rainier, and E. A. Travis, representing the Riker and Kelly-Springfield.

Although many other makes of trucks will be exhibited, space for only those makes whose representatives had contracted and paid for exhibition space were allowed to participate in the drawing. The makes of trucks included in the drawing were as follows: Atterbury, Bessemer, Brockway, Clinton, Federal, Gramm-Bernstein, Indiana, Transport, Vim, Ward-La France and Highway Trailer.

The show at which the above makes of trucks will be exhibited will be more in the nature of a Highway Transportation show than a mere motor truck show. For the first time in the history of motor truck exhibitions the show will be held by a users' organization instead of a dealers' or manufacturers' association; though the details of the show itself will be supervised by a committee of the Dealers' Division of the Motor Truck Association. The personnel of the show committee includes A. M. Welch, Reo, Chairman; J. A. Inness, Brockway; W. H. Moore, Garford; Paul Campbell, Indiana; R. S. Locke, Federal; W. Lawson, Nash, and E. A. Travis, Locomobile.

SUPPLY COMPANY MAKES PARTS

SPARTANBURG, S. C., Nov. 18—Greenwood, S. C., is to have a plant fully equipped to manufacture automobile parts in the near future, according to a statement by E. M. White, manager of the Southern Automobile Supply Co. Petition for an increase of the capital stock from $50,000 to $100,000 has been granted by the Secretary of State. As soon as the additional stock is subscribed the full equipment for the manufacture of parts will be installed. The concern will specialize in the making of unpatented parts, such as driveshafts, axles, bearings, etc. Apparatus for cutting gears will also be installed. White says his plan is not to sell more cars than he is now selling but to keep those already sold in good running condition by the manufacture of parts.

U. S. Chamber Sounds Railway Sentiment

Referendum Vote of Members Will Influence Stand on Bus Competition

WASHINGTON, Nov. 23—Incorporated in the ballot sent out by the Chamber of Commerce of the United States to-day to members for a referendum vote on proposals for improvement of street railway lines is a simple question which will sound out the opinion of the nation's leading business men as to motor vehicles as a competitor of the traction companies.

American business, as represented in the National Chamber will ballot on this recommendation of the Public Utilities committee, "Provision should be made against the consequences of unfair competition." It is significant to note that no direct mention is made of the automobile or motor bus. Yet the fact remains that the official report of the special commission appointed by President Wilson to inquire into the street railway problem stressed the importance of competition from these transportation agencies. Attention was called to the failure of the railways to overcome this competition particularly in sections where motor transportation had become firmly established. It was pointed out that the traction companies lost millions in fares. Complaint was made of inequities of taxation.

The committee recommended to the membership that "regulation should everywhere be instituted that will promptly follow changes in the situation of the companies rendering service of local transportation." As to regulatory measures, obviously involving the only effective competitors, automobiles, the committee recommended that it is a duty on the part of the public to protect the companies from unfair competition from any source.

Must Consider Developments

"This does not mean," the Chamber's Committee says, "that local transportation as it now exists should be perpetuated regardless of advances that may be achieved in the art of transportation or in the science of regulation. It does mean, however, that a company which is rendering service and which is developed in efficiency should not be subjected to competition from any other source which is not under corresponding regulation and obligations. The committee recommends that careful provision be made to prevent the disastrous consequences of unfair competition.

The question of fares charged by motor bus companies and other phases of competition are referred to only indirectly as follows:

"The whole purpose of regulation likewise implies that the companies subject to regulation should be responsible only for performing the service they have undertaken. Their efficiency and the reasonableness of their rates of charge are the matters which should have undivided attention. Reasonableness in rates should be decided only with reference to the service that is rendered. In other words, the rates charged for street railway transportation should not be made an indirect method of taxation for the community."

The committee made no specific recommendation as to the Federal Commission's conclusion that traction companies should render service at cost. The returns of the referendum will not be compiled until early spring.

Champion Gets Verdict in Standish Action

OMAHA, Nov. 19—The Champion Spark Plug Co., Toledo, won its suit against the Myles Standish Co., Omaha, in the United States District Court here. Infringement of the Stranahan patents and imitation of the Champion X plug for Fords were alleged and the defendant was restrained on both points, with the amount of damages to be proved later by Champion. The trial consumed two weeks, before Judge Woodruff. Bonds on appeal were fixed at $5,000 in the patent case and $25,000 in the unfair competition suit. The court refused to forbid Champion to use the decision in its advertising.

The Court, in its opinion, pointed out that Champion has had a contract with the Ford Motor Co. since 1911; that Champion has sustained an estimated loss of $500,000 since that time through selling its plugs to Ford; that $500,000 has been spent in advertising by Champion; that this loss and this advertising have created a good-will for Champion which assured it replacement business from Ford owners; and that this good-will is a property which the Court should protect.

The unfair competition allegation was that Standish used on its cartons cuts which were deceptive and that the Standish plug was sold as "One-half inch Standard spark plug for Fords." The opinion stated that any imitation product must be so labeled and sold that the buyer clearly understands what he is buying, and that one manufacturer has not the right to trade upon the good-will or reputation of another unfairly.

FENDER ORDINANCE KILLED

CHICAGO, Nov. 18—The injunction obtained by truck owners against enforcement by the city authorities of the fender ordinance has been made permanent and perpetual by a decree entered in circuit court here. Under the ordinance all truck owners would have been compelled to equip their vehicles with fenders to prevent accidents to pedestrians. In contesting the ordinance truck owners showed that the fenders from which selection might be made were impractical and difficult to keep in working order.

Commission Decides for Bus Monopolies

Holds No Competition Rule Shall Govern Operation—See Business Growth

SPRINGFIELD, ILL., Nov. 20—Predicting that the advent of the hard-road system in Illinois will so greatly increase the number of motor bus transportation companies that it will raise them from one of the least to one of the most important places among the state's public utilities, T. E. Dempcy of the Public Utilities Commission announces that the commission has established a policy of no-competition which will go far toward simplifying the state's control of them.

This was exemplified by the commission's action in denying a certificate of necessity and convenience to the White Star Bus Co. to operate between West Frankfort and Frankfort Heights in Franklin County, a territory already traveled by the Southern Illinois Line.

The White Star company was ordered to withdraw its equipment and cease operation. The Southern Illinois company, it is announced had a monopoly on motor bus business in that country, and so long as it supplied sufficient and satisfactory service would continue to have a monopoly.

The commission's authority is beyond dispute. It was questioned by the commission itself two years ago, in refusing a certificate of convenience and necessity to a Peoria-Bartonville line.

The Supreme Court denied the commission's objection and held that as motor bus lines are nothing else but public utilities, the Public Utilities Commission must assume supervision.

Easier Bank Credits Help Milwaukee Trade

MILWAUKEE, Nov. 22—Although dealers in passenger cars are still obliged to contend with stiff sales resistance, an encouraging note is sounded in numerous quarters which indicates that things are loosening up and it is relatively less difficult to sell new cars than it was two to four weeks ago. One factor that is making this possible is that some of the smaller banks find their vaults filled to the brim with accumulated funds and are willing to accept good risks at a declining rate of interest. This is not a blanket proposition, but confined to instances so far more or less isolated. Eventually, it is believed the banks will find it necessary to go much further to turn over their funds profitably. While a month ago interest rates were up to 8 or 8½ per cent on commercial loans, with practically no funds available, instances have been reported in the past week where high class dealers have been able to get a reasonable accommodation at from 7 to 8 per cent.

Truck Sales Heads Discuss Problems

Time Sales Must Be Closely Scrutinized—Should Help Dealers with Bankers

(*Continued from page* 1087)

in solving the problems of the farmer, and the railway, as well as all industry, should be brought home to your banker when you go to him to talk credits."

Referring to time payment sales, Wilson said that it had been a stumbling block in the progress of the truck industry, and declared that any time sales now and forever should be scrutinized carefully. He said a lack of confidence in a dealer's ability as a credit man and a business man often prompted bankers to refuse credit, and he urged that nothing was more likely to aggravate such a situation than the time payment sale. In promoting a close relationship between the dealer and his banker, Wilson urged upon the sales managers that they help their dealer select his banker and at the same time help the local banker select their dealer.

Moock offered a suggestion which met with hearty favor, in which he urged motor vehicle chautauquas throughout the country to be addressed by specialists on banking, merchandising, highways and accounting. His plan is to divide the country into zones in such numbers that every dealer in the country will be able to attend one of the chautauquas and go to school for a week to listen to the advice and suggestions of these experts.

Howson in speaking of the railroad as a market for the motor truck, said the slump industry now was going through presaged improvement in the industry in that it will cause everyone to get down to intensive effort. There is a threefold contact between the railroad and the motor truck, said Mr. Howson, first as shipper, as a competitor and as a customer. The car shortage, he said, had been wiped out and shippers now will get service.

Railroads to Meet Demands

He told of expansion plans of railroads which mean better conditions for the automotive industry, and said the railways were taking advantage of the slump that would enable them to handle freight traffic without congestion when freight begins again to move in normal quantity.

Ultimately, he said, the motor truck and the railway would supplement each other rather than compete. He said the railway by handling short haul traffic at a loss was making as great a mistake as the attempt of the motor truck to handle the long haul. He urged the truck for traffic up to 30 miles, the electric car up to 60, and the railway for the long haul. There are many ways the motor truck can be used efficiently in co-operation with the railways, he said.

An amendment to the by-laws with regard to the admission of new members, was adopted at the meeting Thursday morning. Under the terms of the amendment the clause requiring the applicant to be employed by a company which has manufactured and sold not less than 200 trucks within the preceding twelve months, was eliminated, and there is no requirement necessary now save that the applicant is employed by a producing company.

Ford Gets Concessions from Parts Factories

CLEVELAND, Nov. 20—Manufacturers in this city who have been making parts for the Ford Motor Co. are asking price concessions to enable that firm to meet its price reductions in cars without cutting labor costs. In a few instances the reductions have not been as great as desired by the Ford company, but as one Cleveland manufacturer said, a concerted effort is being made to bring prices in the motor field to a more reasonable level.

It was said that Ford demanded a reduction of 35 to 40 per cent in a part manufactured in Cleveland. Such a cut would obviously mean a cut in wages at the plant making the reduction. This particular manufacturer made a cut of 10 per cent without reducing labor. Another plant reports that it has reduced the unit price of a part for the Ford Motor Co. from 60 cents to 52 cents without reducing wages.

Nash Motors Closes to Adjust Inventory

MILWAUKEE, Nov. 23—Between two thousand and twenty-five hundred employees at the Nash Motors Co., Kenosha, were laid off Saturday, and notices were posted instructing the remaining employees that all would be laid off by Thanksgiving Day for at least two weeks pending inventory and readjustment.

W. H. Alford, vice-president, said as many as possible would be re-hired but that the force would be limited strictly to the demands of the business.

BOSCH REDUCES DEPARTMENT

SPRINGFIELD, MASS., Nov. 20—According to a statement of President Murray of the American Bosch Magneto Corp. yesterday, the number of working days will probably be further reduced in two or three departments; a three-day week to affect about one-fifth of the present force of employees. The schedule of the departments affected is to be reduced so that other departments may catch up in their schedule.

Despite the present dull conditions, the plant sees a prosperous year ahead and has enlarged its sales force to accommodate an enlarged output. Several promotions and shifts have been made in the branch sales offices. A. K. Chambers, formerly of the general sales department in this city, will become manager of the Chicago office.

Equipment Makers Decline Guarantees

Take Position at A. E. A. Convention That Jobbers Should Share Burden

CHICAGO, Nov. 20—The Automotive Equipment Association elected a manufacturer president, put jobber membership on a "wholesale only" basis and looked for means of holding up the sales curve at its annual convention and business exhibit here this week.

Attendance at the convention sessions ran between 600 and 700 and the great floor and annex of the Coliseum were thronged most of the week with jobbers and buyers inspecting the offerings of nearly 200 manufacturers, making the meeting and exhibit the greatest in the history of the industry.

Buying was light. The jobbers followed the lead of their customers in this respect and it was brought out in the meetings that the situation was forcing manufacturers into short purchasing of raw materials. Both manufacturers and jobbers saw in this a menace to adequate stocks when the spring demand becomes active and there was much discussion, with some promise of action, of more intensive selling expected to yield, at least by the first of the new year, a good volume of business.

The manufacturers' division refused to adopt the directors' suggestion that prices be guaranteed against decline. Though a few producers indicated that lower prices might be expected, the majority said this was impossible for some months to come. If a decline should materialize, they said, the jobber, who benefited by rising prices a year and two years ago, should share in the burden. Some manufacturers individually promised to consider the guarantee plan. The manufacturers also rejected the directors' suggestion that freight charges be absorbed or that price differentials be established for different territories. They felt that the jobber should do his own adjusting, a process which would be costly and cumbersome if handled at the factories. The manufacturers declined also to lengthen wholesale discounts.

Robert A. Stranahan, president of the Champion Spark Plug Co., was elected president, the first to serve from the ranks of the manufacturers, and Howard M. Dine of Dine-De Wees Co., Canton, Ohio, jobber, named vice-president.

The summer meeting will be held at Mackinac Island, Lake Michigan, July 4-9, and the 1921 convention and exhibit at the Coliseum, Chicago, Nov. 14-19.

STUDEBAKER CUTS FORCE

SOUTH BEND, IND., Nov. 22—The Studebaker Corp. has laid off 2000 of the employees in its plant here. The curtailment was attributed to temporary cessation of buying by the public. The plant has been running to capacity.

Morgans-duPonts Buy G. M. C. Control

Transaction Brings New Stability to Financial Market—New Capital Unlimited

(*Continued from page* 1086)

This contest was abandoned later and gave way to an alliance. The Morgans and the duPonts together will constitute one of the most powerful factors in the world of finance. The Morgans control unlimited capital while the duPonts are manufacturers and merchandisers besides possessing one of the finest engineering organizations in the United States.

The affiliation of the two powerful houses in the motor industry is hailed in business and financial circles as a powerful stabilizing factor. Its ramifications in this respect will extend far beyond the field of motors. Additional heavy investment in a line which has suffered seriously by reason of readjustment bespeaks supreme confidence not only in the future of automobiles but in that of the country as well. A steadying influence was exerted almost immediately in the stock market and almost the entire list rallied after a long continued slump which had occasioned serious alarm. It was hailed as a signal by powerful interests that the bottom had been reached and that it was time to buy.

There was a touch of the dramatic to the transaction which involved approximately $50,000,000. Once begun the negotiations were carried through with almost startling speed. They were marked by a series of conferences which began last Thursday and continued almost uninterrupted day and night until late Monday. There came this laconic and unvarnished statement from the office of Durant:

"I have sold a substantial block of stock of the General Motors Corp. to the duPont Securities Corp. of Wilmington, Del., which has been formed by Pierre S. duPont and his associates and in the stock of which I will have a large interest."

Durant Still Holds 1,500,000

The sale involved about 3,000,000 of the 19,000,000 shares of General Motors stock outstanding. It leaves Durant and his friends with a large investment interest in the company estimated at as much as 1,500,000 shares. No definite statement has been made as to the amount of cash involved. The market value of the stock Monday was $47,250,000 but Durant took a large part of his payment in the shares of the duPont Securities Corp.

An interesting chapter might be written about the duPont Securities Corp. itself. It was proposed in 1919 as a holding concern but the plan was abandoned and it was not until to-day that the company was incorporated at Wilmington with a capital of $7,000,000 in preferred stock and 100,000 shares of common of no par value. The incorporators included Pierre duPont and J. J. Raskob, chairman of the General Motors finance committee. Pierre duPont is now chairman of the General Motors board.

Former duPont investments in the corporation were held by the duPont American Industries Co., which was formed for that purpose. This included on Dec. 31 last, 238,504 shares of General Motors common and 159,111 shares of the common of Chevrolet Motors Co. of Delaware.

Stock Sold Low as 12⅞

The accumulation by Durant of the shares he has sold illustrated strikingly his confidence in the future of the great company he has done so much to build up. In the last few weeks the stock had sold down to 12⅞ from 42, the year's high, on March 26. Durant went into the market to support the stock. He was convinced that much of the offerings were by interests which were selling short for speculative purposes and that most of this stock would not actually be delivered. His own confidence in the industry was not shared, however, by investors in all parts of the country who had bought when motors were rising to their heights of prosperity. These holders were shaken out and enormous quantities of stock were acquired for Durant by his brokers. The Morgans and duPonts were buying at the same time.

Some of Durant's purchasers were heavily margined and at a time like this it was a heavy burden to carry. It is reported unofficially that the price paid Durant averaged $13 a share or $130 a share in the old stock. It is not believed he suffered any serious loss at this price. Wall Street has it that the cash involved was around $20,000,000. The transaction was underwritten by the Morgans and gives the duPonts approximately 38 per cent of the common stock outstanding.

Announcement was made in October that Durant had entered the investment banking field at the head of the Durant corporation to supplant the stockholders service division of General Motors. The new company was designed to distribute stocks on the part payment plan and specialized in General Motors common. It is now apparent this was to have helped Durant absorb the stock he was buying in the market.

Morgan Interests Not New

The interests of the Morgans in General Motors has been shorter lived than that of the duPonts but is said to have covered a considerably longer period than has elapsed since they actually became a factor in the company. It was announced last June that Morgan & Co. had acquired an interest in the corporation and had underwritten $3,219,856 common shares of no par value of which 1,800,000 had been by British and Canadian interests and the balance, 1,419,856 shares, had been offered to common stockholders of General Motors at $20 a share. If it can be assumed that the price paid in the present transactions averaged $13 a share, the total involved was around $20,000,000, less than it would have been at the offering price.

The 1,800,000 shares sold to foreign account was jointly acquired by Explo-

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Detroit Sees Gain for Entire Industry

Control of General Motors by Powerful Interests Will Aid All Motors

DETROIT, Nov. 24—Purchase of speculative holdings of W. C. Durant in General Motors by powerful financiers is regarded by automobile executives here as certain to have a most salutary effect on the industry. Entrance of the Morgan interests following the duPonts is expected to inspire confidence and is seen as an indication that financiers look upon the motor vehicle as vital to the country's welfare.

"It will solidify conditions in the world," said H. M. Jewett, president of the Paige-Detroit Motor Car Co., "and is bound to prove of great benefit to the industry. The action of big financial interests in getting behind General Motors will create a more substantial feeling and is just one more indorsement of our contention that the motor vehicle is an absolute essential in promoting progress."

Banks here were inclined to be reticent when asked for their opinion regarding the effect, though the attitude of local financiers is apparently summed up in the terse statement of Emory W. Clark, president of the First and Old National Bank, that taking hold of any industry by stronger financial interests necessarily increases confidence and attracts more favorable attention to that industry.

Neither Henry Ford nor any of his close associates, nor F. J. Haynes, general manager of Dodge Bros., would make a statement.

Ford to Pay Bonus Totaling $10,000,000

DETROIT, Nov. 24—Bonus payments will be made to Ford employees this month in excess of $10,000,000, it was declared by C. A. Brownell, publicity director, after a conference at the factory to-day. This is the company's answer to a statement emanating from Chicago which said the bonus would be eliminated.

It was declared further that Ford investment certificates, issued to employees last year, will carry an additional 3 per cent interest for the last six months of 1920, making a total of 14 per cent interest for the year. The factory is working on a five-day week basis and during the last two weeks production has ranged from 4000 to 4390 a day.

MICHELIN REDUCES PRICES

NEW YORK, Nov. 24—Reductions ranging from 7½ to 15 per cent have been made by the Michelin Tire Co., Milltown, N. J. Card casings have been cut 7½ per cent; fabrics and all Michelin ring-shaped tubes, 10 per cent, and all soft bead clincher fabric casings, 15 per cent.

Durant's Mastery Due to Optimism

One of First to See Future of Motor Car—Buick Success Led to Pinnacle

NEW YORK, Nov. 24—William C. Durant, whose sale of General Motors securities gave control of the world's greatest automotive corporation to the houses of duPont and Morgan, began his career with nerve, brains, imagination and a genius for financial organization. He and Henry Ford are regarded to-day as the master wizards of the industry.

Durant grasped the future of the motor car at a time when most men were laughing at it and the vision he had then built for him the position he holds to-day. He was not disturbed when others laughed at what they thought his foibles and follies and he has lived to laugh at them.

Born in Boston of revolutionary stock, Durant went to Flint, Mich., with his parents when he was 10 years old and there attended the common schools. His first job was in a grocery store but his first real job was with the Flint Water Co. The company wasn't paying and its salaries were nothing to brag about but young Durant was keenly interested in its affairs and he finally was elected secretary and general manager.

After he put the water company on a paying basis he lost interest in it and began looking around for other decrepit companies he could put on their feet. He quickly acquired a reputation along this line. Then he thought he saw possibilities in road carts and became associated with J. D. Dort in the Dort-Durant Carriage Co. In the first year the company sold 100,000 and put Flint on the map.

While in the cart and carriage business, Durant became interested in automobiles. A man named Buick whom he knew had a gasoline engine designed for farm work. Durant looked it over, suggested improvements and the Buick automobile was born. The Buick business grew slowly but it grew and in 1907, while the country was in the midst of the panic, Durant announced that he was going to make 50,000 the next year.

Predicted 1,000,000 Cars a Year

When his friends tried to convince him he was insane, Durant told them that within ten years the country would produce and sell 1,000,000 cars a year. In spite of his friends he went ahead with his plans and built the great Buick plant at Flint. As soon as it was completed he set 13,000 men to work building automobiles.

With the Buick going full blast, Durant visualized the General Motors Co. of New Jersey, and it was incorporated nine years after the 1907 panic began. It included the Buick, Cadillac, Oakland, Olds, Northway and other companies. The Chevrolet Motor Co. was absorbed in May, 1918, and the United Motors Corp. was taken over the last day of the same year. The great combination has expanded steadily ever since, almost continually acquiring ownership or control of additional companies. The Chevrolet became the closest rival of the Ford.

Durant was one of the first to see the possibilities of American cars in Europe and he believes the market there has scarcely been touched. His production energies of late have been bent upon the development of trucks, tractors, farm machinery and allied lines, for he is convinced the future in this field is as great as in passenger cars.

As an organizer Durant has few peers and his mastery of details is astounding. No man in his organization works harder than he notwithstanding the fortune he has amassed. His intimate knowledge of every detail of the automotive industry will make his continued services invaluable to General Motors and there is no doubt he will continue in its service.

Durant is an optimist and a constructionist. He saw readjustment coming and prepared his company for it so far as that was possible but the corporation will be equally ready to grasp the possibilities of the future.

Chevrolet to Start 100-a-Day Schedule

NEW YORK, Nov. 22—The Tarrytown plant of the Chevrolet Motor Co., which has been running for the past month with only about 200 of its 2000 employees at work, will begin the manufacture of 100 cars a day Dec. 1. It is understood that about 1000 men will be taken back at that time. The normal output of the factory is between 200 and 300 cars a day.

Virtually all the divisions of the General Motors Corp. now are operating on a reduced scale. This is particularly true in its passenger car lines. Cadillac was the last to go on short time and is now operating four days a week. Operations at the various Chevrolet assembly plants have been suspended almost entirely pending the sale of a substantial number completed cars on hand.

DIXIE RUBBER REORGANIZED

MEMPHIS, TENN., Nov. 22—A complete reorganization was effected at a meeting of the officers and stockholders of Dixie Rubber Co. held at Jackson, Miss., and the way was paved for settlement of the litigation now in court which was filed by a minority of the stockholders, asking that a receiver be appointed to replace President C. L. Cadenhead.

At the Jackson meeting Cadenhead and all the other officers and directors of the company resigned. A new board was elected, composed of residents of Mississippi and Arkansas except for one man from Memphis. The new president and general manager will be elected at a meeting to be held here on Dec. 17, at which some decision will be reached regarding the pending litigation. It is probable C. B. Box of Midnight, Miss., will be made president and that the suits against the company will be dismissed.

Big Creditors Fight Ericsson Bankruptcy

Will Propose Reorganization to Lift Receivership—Assets Exceed Claims

NEW YORK, Nov. 24—Merchandise creditors of the Ericsson Mfg. Co. of Buffalo, manufacturers of the Berling magneto and other automotive appliances, decided at a meeting here yesterday to make a determined stand against having the corporation declared bankrupt. They contend that it is solvent and that the interests of the unsecured creditors, whose claims aggregate $365,000, would be sacrificed by bankruptcy proceedings.

The company was thrown into receivership a fortnight ago by the Swedish Ericsson Co., which is said to own a controlling interest in the Buffalo concern. William A. MacDougal and Robert E. Powers were named as receivers by Federal Judge Hazel. This action was followed by the filing of an involuntary bankruptcy petition by three Buffalo creditors whose claims aggregate $3,000. The petition alleges the company committed acts of bankruptcy by making a general assignment of assets for the benefit of the City Trust branch of the Marine Trust Co. It is charged that the assets were transferred with "intent to hinder and delay creditors."

The larger merchandise creditors have formed a committee headed by W. M. Nones of the Norma Company as chairman and Sidney S. Meyers, general counsel of the Motor and Accessory Manufacturers Association, to protect their interests.

Nones and Meyers reported to the creditors that they had conferred with the receivers and had been refused cooperation in combatting the bankruptcy petition. The receivers asserted they would file no answer to the charges but a formal demand to do so will be served upon them. Meyers will appear before Judge Hazel on Dec. 2 when the order is returnable and make an aggressive fight against bankruptcy. In this connection he will propose a plan of reorganization under which it is believed the receivership eventually can be lifted and all the creditors paid in full as they are disposed to co-operate to the fullest extent. Creditors now are filing their claims with Meyers and this includes a large number who are not members of the M. A. M. A. The Irving National Bank of this city, a secured creditor, will co-operate informally.

Has $1,000,000 in Orders

The claims against the company aggregate $1,000,000, but the major part of them are secured. The nominal assets are $1,500,000. The company has $1,000,000 worth of orders on its books and few cancellations have been received.

The Marine Trust Co. of Buffalo is one of the largest creditors but its claim is secured.

Morgans-duPonts Buy G. M. C. Control

British and Canadian Explosive Makers on Board—Position Now Impregnable

(*Continued from page* 1095)

sive Trades, Ltd., of London and Canadian Explosives, Ltd., at $20 a share. Sir Henry McGowan and Arthur Chamberlain of the British company, and William McMasters of the Canadian, were added to the directorate and the Morgans were given six representatives on the board.

The subscription privilege in the June financing required the payment of 10 per cent in cash and the remainder on Dec. 1. The payment due next week from the overseas purchasers will approximate $34,000,000. No statement has been made as to the amount of the issue subscribed by former stockholders but assuming it is all taken up at the opening price, it would add another $25,000,000 in round figures. It is expected that the powerful influences which now control the company will be able to force the market price up to a point high enough so that subscribers will complete their payments rather than forfeit the amount already paid. Receipt of this enormous amount of cash at this time will place General Motors in a position so impregnable that the present slump in the industry can be regarded with more or less indifference.

Of the 20,101,658 shares of common stock of no par value, issued or to be issued, 15,699,091 shares were offered for exchange on and after May 3, 1920, for outstanding common shares of $100 par value on the basis of ten shares of no par value stock for each share of $100 par value.

British Investors Brought in by Morgan

NEW YORK, Nov. 23—The Morgans and duPonts together were responsible for bringing British and Canadian investors into General Motors. The Morgans, with a house in London, always have been close to British capital and the duPonts were brought into contact during the war with Explosives, Ltd., of London, and Canadian Explosives, Ltd., which also were engaged in the manufacture of munitions.

At the close of the war the British companies, following the example of the duPonts in General Motors, decided to enter the field of transportation. The first step in this direction was to acquire substantial holdings in the Dunlop Rubber Co. of England, the leading tire concern of that country. They also entered the Canadian and British branches and then the American Dunlop Co., which will soon get into production in its $15,000,000 factory at Buffalo.

Explosives, Ltd., also owns or controls Sunbeam bicycles and motorcycles, the Rotax Motor Accessories Co., Kynock, Ltd., manufacturers of bicycles and motorcycles, and the British Pluvisian Co., which makes artificial leather used in upholstering automobile bodies. Its investment in General Motors constitutes only about 2½ per cent of the total capital of the American corporation but it is sufficient to establish intimate relations between them.

Receiver Is Named for Hebb and Patriot

LINCOLN, NEB., Nov. 22—Federal Judge T. C. Munger has granted an order appointing Joseph E. Rosenfeld of Omaha receiver of the property of the Hebb Motors Co. and the Patriot Motors Co. The bond of Rosenfeld was fixed at $50,000. The receiver was appointed on application of creditors.

The Patriot Motors company, successors to the Hebb Motors company, which has been operating a large truck factory at Havelock, had issued a call for a meeting of its creditors to be held at Chicago to-day to consider some plan to conserve its assets. This meeting has been called off since action was begun in court. The circular letter to creditors said: "We wish to present an accurate statement of our condition with a view of reaching some plan of meeting at least as nearly as possible all claims against the company. For this purpose we have called a meeting of creditors to be held at the Lasalle Hotel, Room 1811, in Chicago, on Nov. 22, 1920, at 10 o'clock, as a large percentage of our creditors are east of Chicago."

FRANKLIN STARTS RESEARCH

SYRACUSE, Nov. 24—Franklin Automobile Co. has inaugurated a commercial research department whose principal function will be to gather statistics on the market, forecast economic conditions, predetermine what sales performances should be in various territories and as a whole, and analyze sales performances of dealers to point out faults and suggest remedies. E. J. Buchaca will be in charge of the work and W. L. Wales will assist him.

NEW CASTLE TIRE TO RESUME

NEW CASTLE, PA., Nov. 19—Operations at the New Castle Tire & Rubber Co. probably will be resumed about Jan. 1, according to announcements of W. E. Duerstin, general manager. The plant has not been operating since Oct. 1. During the shut-down tire stocks have been completely cleared out. "We have been busy liquidating inventories and are now in a position to resume operations on a scale justified by new business that already is beginning to come in," said Duerstin.

PUSH GOOD WILL ADVERTISING

MEMPHIS, TENN., Nov. 22—In a series of page displays each week in local dailies, a message of importance is carried to the public dwelling on the reliability, permanence and scope of the motor car industry.

Lackawanna Steel Lays Off 1000 Men

Letting Up in Business Responsible — More Reduction to Come Is Statement

BUFFALO, Nov. 19—A material reduction of the working force of the Lackawanna Steel Co. at Lackawanna, which was started last Monday and continued throughout the week halted temporarily Saturday night with more than 1000 employees jobless. More reductions, it was said in Lackawanna last night, would be made during this week.

George F. Downs, president of the company, said last night that the working force had been cut down approximately 1000 during the week. He said that a letting up of business was responsible. He refused to confirm the rumor that more reductions would follow. Downs said that the former payroll of the company contained nearly 8000 names; that about 7000 still are at work. The coal shortage has not affected the Lackawanna plant nor hampered production, according to Downs. The gas furnaces, he also declared, were running to capacity and were unaffected by any shortage.

COURT NAMES RECEIVERS

NEW BRUNSWICK, N. J., Nov. 24—Custodian receivers in the Stanwood Rubber Co. of Elizabeth and Hardman Rubber Corp. of this city, have been appointed by Vice Chancellor Backes on application of George J. Culp of the Mutual Tire & Rubber Corp., and they must show cause by Dec. 30 why statutory receivers should not be appointed. The complaint sets Hardman liabilities at $290,000, $125,000 in excess of assets. Stanwood has outstanding $300,000 of bonded indebtedness and $197,000 in notes, all past due. The companies were arranging a merger and hope to complete it and reorganize before further proceedings are taken.

ALL AMERICAN TRUCK SOLVENT

CHICAGO, Nov. 22—The petition for the appointment of a receiver of the All-American Truck Co. was dismissed by Judge Carpenter in United States District Court here to-day. Local banking interests have furnished the company additional working capital, it was declared. It was also said that the company was solvent to the extent of $568,000 above its liabilities.

B. F. TOBIN DIES

DETROIT, Nov. 23—B. F. Tobin, organizer and chairman of the board of directors of the Continental Motors Corp., died suddenly to-day from acute indigestion. Mr. Tobin was president of the company until last January. He organized the Continental in Chicago and later moved it to Muskegon, this State. He was widely known in automotive circles in this city.

METAL MARKETS

ELOQUENTLY expressive of the changed order of things in the steel market is the attention bestowed upon what fitful and slight demand emanates these days from the automotive industries. Even inquiries, frankly worded so as not to create in the recipients' minds false hopes of early orders, are loudly acclaimed as harbingers of an early return to activity. More profound students of the steel market, however, not only recognize that it would be childish to hope for a return of even a semblance of such conditions as prevailed in the steel market in the earlier part of 1920, but that an honest appraisal of the outlook for 1921 reveals that period as an off-year for the industry. Only the shallow-minded can read into Judge Gary's announcement that the Corporation's prices will remain unaltered, anything even remotely resembling a prop for a continuance of such premiums as the independents still quote over the Corporation's levels. It is an old established axiom in the steel business that the Corporation's price is the one level at which the independents can not sell. Their prices must be either higher or lower. They have been higher since March, 1919, because the demand exceeded the supply, and they are bound to be lower henceforth because the supply exceeds the demand. Several months may pass before this readjustment is completed, but once the slight residue of orders on independents' books has been disposed of, and there are indications of business that can be brought out by price pruning, the Corporation's prices are certain to become maximum quotations with the independents cutting under them as much as is necessary to land orders to keep their plants in operation. In the pig iron market neither the continuance of high coke prices nor the preference of certain large interests for a deadlock to concessions to buyers is saving values from crumbling.

Pig Iron—Following sales of basic at $33, valley, the market for that grade may be nominally quoted at $32@$33. In Buffalo foundry has been resold at as low as $33. Large selling interests aver that they will not countenance any cancellation of orders and, in some instances, they are shifting business from one furnace to another so as to expedite deliveries.

Steel—Since the placing of an order for 5,000 tons of sheets by a Detroit passenger car manufacturer with a Mahoning valley rolling mill, no fresh business of any consequence has been placed, although some tentative inquiries are reported to have been received by sheet makers. Automotive builders have ceased buying single-pickeled and one-pass sheets which were resorted to as makeshifts, when they were unable to obtain satisfactory deliveries of full-finished material. Hot and cold rolled strip makers say they have sufficient orders left to operate at 75 per cent of capacity over the remainder of the year. Sheet mills are operating at about two-thirds capacity.

Aluminum—Sheets of German origin, but some of which are offered as Swiss, have been offered at as low as 35c. Small lots of spot virgin ingots, 98 to 99 per cent pure, have sold at 30c. The sole American producer maintains his previous contract price.

Copper—Resale metal, offered at as low as 14c., is hanging heavily over the market, which remains intensely weak.

Tin—Consumers show little interest in the market's daily fluctuations.

Lead—American Smelting & Refining Co. announced another cut of $10 a ton in official lead prices, making the new level 6 cents New York and East St. Louis, with the outside market on a parity.

Zinc—Holders are looking for bids at 6¼c., East St. Louis.

Brass—Although buyers concede that brass prices are more than reasonable, they show little disposition to place orders at this time.

Gas Tank Refiller Held for Contempt

INDIANAPOLIS, Nov. 22.—Orion K. Stuart, proprietor of the Sun Lite Gas Co. of this city was held in contempt of court by Judge Albert B. Anderson in Federal Court last week for violation of an injunction granted four years ago prohibiting Stuart from refilling Prest-O-Lite gas tanks without first enameling or plating the tanks in such a manner as to obliterate the name of the Prest-O-Lite Co. and permanently plating or stamping on the tank a notice that it had been refilled or recharged.

The defense set up was that Stuart thought he was complying with the terms of the injunction when he painted out the name of the Prest-O-Lite Co. and pasted on the tank a paper label stating that the tank had been refilled. However, Judge Anderson insisted that Stuart had not in good faith tried to obey the injunction. The question of a fine was taken under advisement, and the court stated that if Stuart persisted in violating the order he would be sent to jail.

At the hearing four years ago Stuart narrowly escaped a jail sentence for contempt when he asked Judge Anderson how much stock he held in the Prest-O-Lite Co.

R & V Makes New Four, Six Price Guaranteed

EAST MOLINE, ILL., Nov. 19—The six cylinder R. & V. Knight line will be supplemented by a four-cylinder model which will be ready for distribution early next spring. The price of this new car will be $2150, and it will be made in two body styles—a five-passenger touring and a five-passenger sedan. The same general lines of construction used in the six will be followed in this model. The engine will be a Knight with 3¾ in. bore and 5 in. stroke; the tires 32 x 4 in., and wheelbase 116 in.

The prices on all the six-cylinder models have been guaranteed to May 1. The present prices are $3350 on all open cars, $4000 on the coupé, and $4200 on the seven-passenger sedan.

WEED TO MAKE BUMPER

NEW YORK, Nov. 22—The American Chain Co., which manufactures Weed chains for automobiles and a wide variety of other types of chains, is about to manufacture a bumper. The bumper was shown for the first time at the exhibit of the Automotive Equipment Association in Chicago.

Bank Credits

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, Nov. 24—Commodity price recessions continue. At the week-end and particularly on Monday of this week, however, there was a significant recovery in security prices. This recovery and the lessened tension in the money market, as reflected in interest rates and bank reports, have stimulated confidence in some quarters that the peak of the credit strain has now been passed.

There was a noticeable easing of money rates in the New York market last week. The range of call rates was 6 to 9 per cent, as compared with 7 to 10 per cent the week before. On Monday of this week the rate after market hours declined to 4½ per cent from a closing rate of 5 per cent. This was the lowest rate recorded in about 13 months.

Time rates have also receded and the supply of money offered last week was more abundant. For 60 and 90 days on mixed collateral the rates on Monday of this week were 7¾ per cent to 8 per cent, and for longer maturities 7½ per cent to 7¾ per cent—rates for all-industrial collateral being about ¼ per cent higher than for mixed collateral.

Loans of the New York Associated Banks declined last week $15,242,000, and net demand deposits $32,244,000, accompanied by a reduction of $23,965,000 in aggregate reserves, the excess reserves amounting at the week-end to $12,470,380.

The New York Federal Reserve Bank gained $13,657,000 in reserves, while bills on hand declined $52,188,000, the decline in rediscounts secured by commercial paper amounting to $66,060,000. Meanwhile the bank retired $23,250,000 of the $38,000,000 rediscounted the previous week with other Federal Reserve Banks. Net deposits were lower by $27,521,000, and Federal Reserve notes in circulation declined $2,988,000.

There was a further improvement last week in the condition of the Federal Reserve Banks as a whole. Reserves remained practically unchanged, the gain for the week being only $217,000. Bill holdings were reduced $123,999,000, the chief feature of this reduction being the decline of $89,306,000 in discounts on commercial paper. Net deposits declined $42,024,000, and Federal Reserve note circulation $21,550,000. Accordingly, the ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against net deposits, increased from 47.9 per cent to 48.6 per cent.

BIDDER & SMART TO RESUME

AMESBURY, Nov. 19—The Biddle & Smart Co., the largest manufacturers of automobile bodies in New England, whose plant has been shut down for the past month, will resume operations at once. About 1500 hands were employed in the busy season.

MEN OF THE INDUSTRY

E. E. Allyne, President of Aluminum Manufacturers, Inc., and of its subsidiary, the Aluminum Castings Co. of Cleveland, has resigned on account of ill health and plans to spend the winter in the South. W. P. King, formerly vice-president, has been elected president, to succeed Allyne. King will also be treasurer. George J. Stanley has been made vice-president in charge of production. John H. Watson, Jr., remains secretary.

C. E. Denzer, formerly manager of western sales for the White Co., with headquarters in Cleveland, will take charge of the new White branch to be opened at Denver. Denzer will have charge of sales and Thomas Parramore will be in charge of the service department. The Denver branch will be the distribution center for the greater part of the western territory.

C. R. Stowell has been made manager of the Bearings Service Co., Fresno, Cal., branch. He was formerly connected with the San Francisco branch. A. F. Ward, formerly assistant service manager of the Timken-Detroit Axle Co., has been made manager of the Omaha branch of the Bearings Service Co.

George W. Seiberling has been made general manager of tire factories of the United States Rubber Co. and Erwin Meyer, chief consulting chemist. John J. Shea has been made factory manager of the Colt Plant, Revere Rubber Co., and A. P. Delahunt, chief accountant.

Bert Dingley, the former race driver, who has for sometime been head of the Marmon service maintenance department, has been taken over by the Marmon factory organization and placed in charge of all inspection from the point at which assembly begins.

James E. Ryan, treasurer and general manager of the International Purchasing & Engineering Co., Detroit, has left on a three months trip abroad upon which he will call on all European automobile manufacturers represented by the company in America.

D. M. Boyd has been elected secretary of the Traffic Motor Truck Corp. He was formerly secretary and treasurer of Boyd-Richardson, Inc. He succeeds H. P. Mammen, who continues as treasurer.

W. F. Donlin, for three years associated with the King Motor Car Co., has been made general sales manager of the Barley Motor Car Co. of Kalamazoo, manufacturers of Roamer cars.

William G. Toland has been appointed general truck sales manager of Hare's Motors, Inc. He was formerly truck sales manager for Packard in the New England and New Jersey territories.

George C. Murray, formerly connected with the Aluminum Castings Co., has left Detroit, for San Francisco, where he will have charge of the sale of Fruehauf trailers on the Coast.

William Brown has been transferred from his position as supervisor of purchasing to become special representative of the sales department of the Marmon organization.

Leigh Smith, who has been in charge of the service department of the Fisher Body Co., has been made service manager ofthe Fleetwhan-Buick Co., of Wyandotte, Mich.

Claude S. Hyman, former advertising manager of the Standard Motor Truck Co., Detroit, has joined the Charles H. Fuller advertising agency, Chicago.

W. W. Wetzler has been made chief of the credit department of the Gerlinger Electric Steel Casting Co., West Allis, Wis.

North American Storage Battery Co., Indianapolis, which will begin the manufacture of starting and lighting batteries for automobiles and batteries for electric cars about Dec. 1, has leased 17,000 feet of floor space for ten years in the building at 40 West Pratt Street.

Republic Shows Gain in June Balance Sheet

NEW YORK, Nov. 22—The balance sheet of the Republic Motor Truck Co. as of June 30, last, compares as follows with 1919:

Assets	1920	1919
Prop. acct., deprec. val.	$2,009,651	$2,146,748
Inv. in and adv. to affil. cos.	1,814,888	1,893,152
Def'd assets	281,788	303,854
Good will	4,805,936	4,805,936
Current Assets		
Notes and accts. receiv.	1,226 610	373,928
Inventories	6,781,561	5,301,479
Cash	1,162,965	1,268,823
U. S. Lib. bds	8,714	120,975
Totals	$18,092,113	$16,214,895
Liabilities		
Pfd. stk	$854,000	$904,000
Com. stk	8,418,450	8,418,450
Pur. Mon. obl.	3,089,281	3,227,509
Res. for taxes and conting.	741,583	562,370
Surplus	2,719,034	1,242,143
Current Liabilities		
Notes and accts. payable	1,873,826	1,475,925
Accrd. liab	284,970	291,040
Mis. cur. liab	110,969	93,527
Totals	$18,092,113	$16,214,895

On June 30, 1920, the net assets applicable to the common stock amounted to $6,203,448, or $62 per shr. of no par value. This figure is after allowing for the redemption of preferred stock at $115 per shr. and after deducting "goodwill" carried at $4,805,936, or $48 per shr.

Grant Issues Notes to Carry Inventory

CLEVELAND, Nov. 22—The Grant Motor Car Corp. will offer to stockholders an issue of short time notes bearing 8 per cent interest and maturing on or before Nov. 21, 1921, according to an announcement that has been made at offices of the corporation in this city.

The notes are to be offered at 95 on a basis of $20 a share for each share of preferred stock and $2 of common stock now held. President Shaw says that when selling of motor cars stopped practically overnight the Grant Co. took steps to stop incoming materials, but before the plans formulated could be executed inventory increased in excess of $500,000.

Based upon spring and early summer normal deliveries of cars this inventory could have been liquidated quickly, reads the letter. But with the almost complete stoppage of sales no such liquidation is possible. As a result the company now faces the necessity of financing a big and valuable inventory until the resumption of buying, which will rapidly provide funds for all requirements.

FINANCIAL NOTES

Fisher Body Corp. reports sales for the first quarter ending July 31, 1920, as $22,627,000 compared with $8,369,000 for the corresponding three months in 1919. In the second quarter sales were $23,632,000 compared with $12,831,000 in the previous year. Sales for the third quarter are expected to approximate 85 per cent of those in the second quarter.

Stewart-Warner Speedometer Corp. for the nine months ended Sept. 30 reports net profits after charges and Federal taxes, of $1,791,426, equivalent to $4.47 a share on the 400,000 shares of no par stock. With an allowance of $1,200,000 for dividends the company has a surplus of $591,426 for the nine months.

Lee Tire & Rubber Co. reports net sales for the nine months ended Sept. 30 as $6,204,586, compared with $4,492,189 in the same period of 1919, an increase of $1,712,397. After all charges before tax deductions there was a net profit of $640,684, which compares with $460,512 in the 1919 period.

Chandler Motor Car Co. has declared a regular quarterly dividend of $2.50 a share payable Jan. 3. President Chandler reported earnings for the past three months as largely in excess of dividend requirements. Current operations were reported satisfactory for this time of year.

Ajax Rubber Co., Inc., has declared a quarterly dividend of $1 a share payable Dec. 15, placing the stock on a $4 annual basis, compared with $6 which had been paid since August, 1917. The reduction was made in view of business and financial conditions.

Walter Motor Truck Corp., New York, has increased its capital stock to $1,000,000 to permit of increased production. The company is building a new plant at Poughkeepsie which will be in operation in January.

Farmers Tractor Corp., Stevens Point, Wis., has been incorporated with a capital stock of $500,000 by A. J. Patch, William Mainland and A. N. Stevenson, all of Oshkosh, Wis.

Avery Co. notes at par to the extent of $3,000,000 are being offered by bankers who took over the entire issue. The notes constitute the company's only funded debt.

SINGER FOUND BANKRUPT

NEW YORK, Nov. 22—The Singer Motor Co. of Mt. Vernon, which has been in receivership for some time, has been adjudged bankrupt and its assets will be sold at the plant Nov. 26. The bankruptcy petition followed vain efforts to settle the company's affairs. The plan which was proposed did not prove satisfactory but Max Lowenthal, the receiver, is continuing his investigation of the company's affairs.

AMERICAN BODY BUYS PLANT

PHILADELPHIA, Nov. 19—Title has been taken by the American Motor Body Corp., controlled by the American Can Co., from the Hale & Kilburn Corp. to the latter's factory at Eighteenth and Huntingdon streets, including five five-story factory buildings and thirteen one and two-story mills and shops. The transfer was subject to mortgage of $2,000,000. Two lots at 2546 and 2548 North Eighteenth Street were included in the transaction.

Calendar

SHOWS

Dec. 7-10—Cincinnati, Automobile Show in connection with Ohio Automotive Trade Ass'n Convention, auspices of Cincinnati Automotive Trade Ass'n, Music Hall, J. J. Behle, Mgr.

Dec. 10-18—New York. Motor Boat Show. Grand Central Palace.

Dec. 11-20—Los Angeles, Annual Automobile Show, Los Angeles Motor Car Dealers' Ass'n.

Jan. 3-8 — New York, Motor Truck Show, Motor Truck Ass'n of America, Twelfth Regiment Armory.

Jan. 8-15—New York. National Passenger Car Show, Grand Central Palace. Auspices of N.A.C.C.

Jan. 17-23—Milwaukee. Annual Automobile Show, Milwaukee Automotive Dealers' Ass'n.

Jan. 22-27—San Francisco, Second Annual Pacific Coast Automotive Equipment Exposition, Auditorium.

Jan. 22-29—Cleveland, Annual Passenger Car Show, Cleveland Mfr's & Dealers' Ass'n, Wigmore Coliseum.

Jan. 22-29—Montreal, Annual Automobile Show, Montreal Automobile Trade Ass'n, Motordrome Bldg.

Jan. 29-Feb. 4 — Chicago, National Passenger Car Show, Coliseum, Auspices of N.A.C.C.

Feb. 5-12—Minneapolis, Annual Automobile Show, Minneapolis Automobile Trade Ass'n.

Feb. 6-12—Columbus, National Tractor Show, Columbus Tractor & Implement Club, Ohio State Fair Grounds.

Feb. 12-19—Hartford, Conn., Annual, Automobile Show, Hartford Automobile Dealers Ass'n, Armory, Arthur Fifoot, Mgr.

Feb. 12-19—Kansas City. Annual Automobile Show, Kansas City Motor Car Dealers' Ass'n.

Feb. 14-19—St. Louis, Annual Automobile Show, St. Louis Automobile M'f'rs & Dealers' Ass'n, Robt. E. Lee, Mgr.

Feb. 14-19—Winnipeg, Western Canada Automotive Equipment Show.

Feb. 19-26—San Francisco, Fifth Annual Pacific Automobile Show, Exposition Auditorium, George Mahlgreen, Mgr.

Feb. 21-26—Louisville, Annual Automobile Show, Louisville Automobile Dealers Ass'n, First Regiment Armory, C. L. Alderson, sec'y.

Mar. 2-10—Des Moines, Annual Automobile Show, Coliseum, C. G. Van Vliet, Mgr.

Mar. 5-12—Brooklyn, Annual Automobile Show, Brooklyn Motor Vehicle Dealers' Ass'n, 23d Regiment Armory, George C. Lewis, chairman.

Mar. 7-12—Syracuse, N. Y., Annual Automobile Show, Syracuse Automobile Dealers Ass'n, Armory, Howard H. Smith, Mgr.

Mar. 7-12—Indianapolis, Annual Automobile Show, Indianapolis Automotive Trade Ass'n, Automobile Bldg., State Fair Grounds, John Orman, Mgr.

Mar. 12-19—Boston, Annual Automobile Show, Mechanics Bldg. and South Armory.

Mar. 14-19—Omaha, Annual Automobile Show, Omaha Automobile Trade Ass'n, Inc., Omaha Auditorium, C. G. Powell, Mgr.

April 4-9—Seattle, Annual Automobile Show, Seattle Motor Car Dealers' Ass'n, Arena Hippodrome.

April— Chattanooga, Tenn., Spring Automobile Show, Chattanooga Automotive Trade Ass'n, Sunday Tabernacle, C. A. Noone, sec'y.

FOREIGN SHOWS

Nov. 29-Dec. 4—London, Cycle and Motorcycle Show, Cycle and Motorcycle Mfr's and Traders Union, Ltd., Olympia.

Jan. 7 — Sydney, Australian Motor Show.

Jan. 22-29 — Colombo, Ceylon Motor Show.

Feb. 7—Delhi, India, Delhi Motor Show.

CONVENTIONS

Nov. 30-Dec. 3—St. Louis, Third Annual Meeting and Exhibition, Automobile Accessories Branch, National Hardware Ass'n.

Dec. 7-10—New York. Annual meeting American Society of Mechanical Engineers. Engineering Societies Building.

Dec. 8-9 — Cincinnati, Annual Convention, Ohio Automobile Jobbers' Association

Dec. 13—Washington, Convention of American Association of State Highway Officials.

Dec. 28-30 — Chicago, Annual Meeting American Society of Agricultural Engineers.

Jan. 7—New York, Advertising Managers Council, Motor & Accessory Manufacturers' Ass'n.

Jan. 11-13—S. A. E. Annual Meeting, New York City.

Feb. 2-4—Chicago, First Annual Meeting, Automotive Electric Service Assn. Hotel La Salle.

Oct. 12-14, 1921—Chicago, Twenty-Eighth Annual, Convention National Implement & Vehicle Ass'n.

Massachusetts Acts to Keep Roads Open

BOSTON, Nov. 19—A proposal that local master teamsters merge their forces with those of the city in the work of opening up traffic channels in any big snowstorms Winter may bring is made in a circular letter to such men sent out now by Mayor Peters. All boss teamsters are invited to a conference Dec. 1, to discuss the matter.

Brookline is all ready for anything in the line of snow. It has purchased a large snow-removing machine. At a meeting of the Essex County Associated Boards of Trade held last evening at the Merrimac Valley Country Club, Methuen, action was taken on the matter of snow removal and it was voted that a bill be prepared for the next legislature providing that State roads be kept open each Winter at the expense of the State. It was brought out at the meeting that the State this year can do no more than supply plows, funds for anything in addition being lacking, but with the passing of the proposed bill the roads would be kept open for automobile transportation the year around.

LICENSE MICHIGAN INSURANCE

GRAND RAPIDS, MICH., Nov. 18—The Michigan Automobile Insurance Co. has been licensed by the Michigan Insurance Department to write fire, theft, liability, property damage and collision insurance. It expects to begin operations soon and hopes to obtain permission to do business in Illinois, Ohio and Indiana. The authorized capital is $250,000, all but $50,000 of which has been paid in. Herbert D. Webber is president of the company.

Farm Bureau to Hear Need for Good Roads

WASHINGTON, Nov. 22—The relationship between good roads and agriculture and the necessity for a constructive road building program as an adjunct to a national agricultural policy, will be discussed at the second annual convention of the American Farm Bureau Federation at Indianapolis, Dec. 6, 7, and 8. The speakers will include Governor W. P. G. Harding of the Federal Reserve Board, several state governors, highway, transportation and farm experts.

The importance of adequate means of transportation for marketing farm products and for bringing about closer communication between the producer and the consumer which will be of mutual benefit, will be taken up on the opening day of the convention and the entire afternoon session will be devoted to this discussion. T. H. McDonald, chief of the U. S. Bureau of Good Roads, will tell of the need of more and better highways and the necessity of making provision for them in a national agricultural program. He will also dwell on the advantages to the farmer offered by the motor truck for marketing products over short distances. H. G. Shirley, Secretary-treasurer of the Federal Highway Council, will present a national highway policy covering both construction and maintenance of highways.

Auxiliary Completes Round Trip to Europe

NEW YORK, Nov. 22—The most remarkable of all voyages ever made by a small boat was unquestionably that completed to-day when the 35-ft. waterline auxiliary ketch Typhoon arrived in New York Harbor after a round trip voyage across the Atlantic. Typhoon, owned and commanded by William Washburn Nutting, managing editor of *Motor Boat*, designed by William Atkin and built in the boat shops of the Alexander Graham Bell Laboratories, Baddeck, Nova Scotia, sailed from Baddeck on July 17 for Cowes, Isle of Wight, England, to report the races for the British International motor boat trophy. She made the trans-Atlantic passage from land to land in 15 days 9 hours.

The return voyage was made via the Bay of Biscay and the Azores. Typhoon left Ponta del Gada, Azores, Oct. 17, and encountered the severe gales which caused several ocean liners to send out distress signals, Nov. 17. She was then about 500 miles off the coast. At one time the crew, which on the return voyage consisted of Mr. Nutting, James Dorsett and Uffa Fox, believed the little vessel to be lost. The Navy Department had been requested to watch for the Typhoon, and reported her as having been spoken by a British vessel at 7:15 a. m., Nov. 19. She came into New York Bay, Nov. 22.

The powerplant of Typhoon is single-cylinder Mianus oil-burning engine of modified Diesel type.